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Jane Saffery

The
BALL
Red Book

Cultural Notes

"FLOWER SEEDS FOR FLORISTS"

20 Cents

Second Edition
1933

Gro. J. Ball.

The
BALL RED BOOK

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The Purpose of this "Red Book"

THE VERY foundation of progress is the irresistible fact of changing conditions. These two factors are as inseparable as day and night, and are ever going on. It has been said that "When we can't change we're through." We might modify this by saying, "When we do not change readily we're slipping." We are well beyond the middle of a supreme test of our ability to adjust ourselves to changing business conditions. Some of us growers are meeting it by abandoning antiquated houses that are costly to maintain. Scaling down costs by close management, adding other lines, especially vegetables for a local outlet, as well as broadening the market for flowers are a few suggestions we meet right along for adjusting ourselves to these changing times. Another change we note is that cut-flower crops in particular are not grown as warm as formerly and they seem the better for it. Not only will they hold up better but fuel is conserved; quantity is reduced, it is true, but that, too, is a benefit.

It is perfectly clear that greater interest is being taken in "The best varieties"; ever an important question, it is a vital one today. Improved varieties are changing our set-up constantly. The alertness of the grower is ever challenged in picking them over, for their suitability to the many and varying conditions they sometimes get into is frequently lacking. But the outstanding fact remains that our plants are being constantly bettered — changed — and while we cannot invest in everything new that comes along, an interest must be taken in the bettered stock.

And what is of equal importance, we must be ever alert to changing our system of growing for this is being continually bettered. Use common sense in depending upon what some other grower suggests, for your conditions might differ considerably from his. And in our broad country we have the choice of more than "57 varieties" of climate—in itself a challenging problem for the grower.

To discuss these changes, as well as the new varieties that perplex us annually, is the purpose of this booklet. That it contributes a helpful suggestion to someone, is the hope of

THE AUTHOR.

About Soils

WHEREVER ordinary crops are grown we note them flourishing in all types of soil — from what is apparently almost sand to stiff clay. This points to a fundamental fact. These extreme conditions are not generally met with for the reason that such soils naturally tend to become what is known as "loam" through incorporating vegetable matter in the form of decaying growth or manure; this material adds the dark color to soils. Clay or sandy loam refers to an excess of either of these materials. As a rule, strong rooting plants such as Roses and Sweet Peas produce a more substantial character of growth in a clay loam; in fact, we rather prefer it for most crops because it retains fertility better, and what is of even more importance, moisture. While most plants are more easily managed in such a soil, it is not at all necessary, for even Roses will make a vigorous growth in sandy loam. It is just a question of handling moisture and fertility to better advantage in the heavier material.

Such plants as Ferns, Begonias, or Cyclamen, produce comparatively feeble roots and will flourish only in a sandy light material; it should be made up largely of leaf mold or similar organic matter. Peat adds retentiveness of moisture to such soil and most plants seem to get a kick out of it; this is largely due, we believe, to its ability to store and hold moisture uniformly. This question of uniformity of soil moisture is an important one, as we have pointed out in connection with a clay soil. When we have a light material that we just can't keep wet, or when it must be watered daily in bright weather, our growth might easily become hardened or even stunted. Such a condition invites disease, especially about the stem or roots, that might be out-grown by a more uniformly vigorous growth. Light material should be preferred for sowing and transplanting seedlings of all kinds, for, as baby plants, they naturally lack the vigor acquired when further developed.

Whether our soil tends to be light or heavy, the basic requirement is humus. It modifies the heavy texture of clay, aerating and making it more porous and it gives body and retentiveness to sandy material. Any form of decaying vegetable matter will do, but nothing equals well-decayed manure for this purpose. This is explained by the fact that the excrement of animals producing it contains the fertilizing elements of their food and in a form well digested by plants. But in a state of nature the annual crop of vegetation — nothing more — dies down and is washed back into the soil, maintaining and building up its fertility to a high degree. What hurts the soil and "runs it down" is the cultivator who annually removes a crop with no thought for the fact that every blade of grass removes some of its stored life.

Natural or organic manure is profitably supplemented with so-called "artificial fertilizers."

And here is another factor that the grower must consider. In the greenhouse, soil is protected from the sterilizing influence of the weather — especially frost. For this reason, harmful soil fungous will flourish in it, making it necessary to sterilize or change it. Some crops seem more or less immune to soil diseases. Sweet Peas are very much not in this class; we believe it is safe to say that 90% of failures with this crop under glass can be traced to soil-borne diseases.

While steam under pressure is probably the most efficient method of destroying harmful soil life, drenching the soil with very hot water has also been found effective, and this will appeal to the grower without steam equipment. The use of various chemicals is not nearly so effective, we find, as is heat in the destruction of this harmful life.

The question might well be asked, "What becomes of the friendly soil life in this destruction?" This cannot be definitely answered. We do know that if soil were actually sterilized — all its life destroyed — our plants could not flourish in it. What seems to happen in so-called sterilized soil is the return of the friendly life from the surrounding or lower soil. It might also be a lower form of life that requires a higher temperature to destroy. We do know definitely that treating soil with a high temperature, whether it be with steam, hot water or an electric outfit, destroys the life in it that is harmful to our plants. The extent to which this is done depends on thoroughness or uniformity of the job. For shallow raised beds we prefer to change the soil, thoroughly washing the sides and bottom of the bed with a hose before filling with fresh soil.

About Watering

THE FACT that most of our plants consist so largely of water — 95% or more — should emphasize the need of its proper supply. It is frequently a limiting factor in growth — profits in other words. We once had a lot of indoor Peas that were flooded thru heavy spring rains for several days. This was around May 1, as the growth was hardening. Instead of the vines drying up late in the month as they ordinarily would, the thorough soaking as well as the moisture stored in the soil, carried them well thru June. Had this happened during mid-winter with cloudy weather and soft growth, the result would, of course, have been disastrous. We once had a lot of newly planted out-door Peas in the field covered with water for several days. We thought they were done for but after the flood drained off they were found bristling with white roots; and how they did grow in the weeks that followed! Had this happened to a lot of Asters or plants of a less vigorous nature, the out-come would have been different. So the amount of water crops require or will stand depends on their nature, the state of their growth, the season as well as the type of

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the soil. This might sound complicated but it isn't to one with some plain plant-growing sense.

We might suggest that when plants are lacking in vigor or are sick they must be watered with caution but we prefer to suggest that such plants, as a rule, should be thrown out for the chances are they have received a check from which they will never fully recover and pay their way. But, of course, we can't always do that so we should give them a chance, or their growing power a rest by withholding water, and, it should be needless to say, feed as well.

Such plants as are classified as annuals go right through their short life without a rest and it is very important that they do not suffer for water or become checked in their growth at any time. On the other hand, when plants of a perennial nature are deprived of water, they are inclined to accept it as their annual resting period and behave accordingly.

It is not an overstatement to say that watering is the most important job in a greenhouse. An experienced grower once stated, in effect, that a man capable of watering is like a poet — born and not made. Probably the fundamental point to remember is: watering should not be done unless needed; then it should be done thoroughly. An important point is to realize its need. Pot plants and shallow raised beds, especially if the soil is rather light, can hardly be over-watered, particularly in open spring weather. Under such conditions watering becomes almost a daily routine and sometimes it becomes necessary to get over newly planted or potted stock twice daily. Shallow rooting plants such as *Calendula* and *Asters* should be watered frequently and not as heavily as you would such deep-rooting plants as *Peas*.

Growth is rapid and free if the watering is properly looked after. In fact, during spring and summer, the limiting factor is indeed the hose. When a flat of seedlings dries out to the wilting stage, water will promptly revive them, to be sure, but it is frequently followed by "damping off," due to wilting which causes the collapse of the plant structure or cells. The *Malacoides* type of *Primula* gives little trouble through rotting in the hands of a grower who maintains his plants uniformly moist. But, if allowed to wilt, the main stem at the ground line shrivels or cracks, inviting the germs of rot that quickly overtake them. These invisible enemies are ever alert to take advantage of any breaking down of resistance in our plants and to deprive them of water to the wilting point, when the plants are young and in full growth, is playing into the hands of this enemy.

Plants in a deep ground bed are more easily managed because moisture working up from below helps out. But we must learn to appreciate the quantity of water required to reach the lower feeding

roots of these beds, especially with deep rooting crops such as Peas. We should also remember that it is quite possible to maintain our soil, especially a poorly drained one, in such a state of excess moisture that the roots are smothered through lack of air, causing them to rot — another manifestation of that invisible enemy. This doesn't happen generally but it might easily if the hose is in the hands of a man who thinks he must "sprinkle" everything every morning as a matter of routine. But he isn't a "poet" with a hose and usually you can't make one out of him.

Seed Sowing

IF YOU HAVE read my circular, "Why Seed Doesn't Grow — Sometimes," you might want to pass up this heading, but — please remember that plenty of experienced growers lose real money thru what I feel free to call carelessness in the handling of seed — good seed too. The seed loss is a small matter usually compared with the delay in getting the crop going and that is sometimes a heavier loss than might be appreciated at the moment.

The important point to remember is that seeds are baby plants and in sowing, proceed accordingly. Such cold-blooded subjects as Calendula, Peas, Larkspur, Stocks or Snapdragons do not call for more than a moderate temperature for the germination of their seed. In fact, Larkspur will remain dormant in a high summer temperature and any attempt at germinating it at this season should be done in flats set under greenhouse benches or in a cool shed. Most cool-temperature crops will germinate quickly in a high temperature, but will show their resentment to it by a soft growth that is easily destroyed by various forms of rot. For this reason we easily get into trouble with summer started Peas, Calendula and Snapdragons.

A great deal of seed that rots in the ground and is condemned as "old" is attacked by the germs of rot in the soil and for this reason fresh, clean or sterilized material only should be used. If there is any question about this the summer sown seed should be protected by the use of Semesan or Formaldehyde dust. We have repeatedly experimented with the use of these materials with Pea seed, getting a perfect stand alongside a check of untreated seed that rotted out nearly 100% in the same soil. The use of peat moss we also find germinates a perfect stand of Peas in mid-summer temperatures because, unlike old soil, it is clean of rot. However, in the case of Peas, we rarely have trouble in fresh soil if it is fairly moist when sowing, covered about a half-inch and not touched with water until well out of the soil. The surface must, of course, be protected some from the drying effect of wind and sun.

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Sometimes Sweet Pea seed, especially the white-seeded kinds, will have such a thin outer coating that it cannot be successfully germinated unless the suggestion of withholding water is used. This is due to such seeds absorbing moisture too rapidly, especially if applied direct to the soil. The same seed might be soaked in clear clean water and not rot because the germs of rot that are present in much soil are absent in water. Sometimes the outer coating of Pea seed develops so hard that soaking in water until it swells must be resorted to or it might lie in the soil a month before germinating. But this is rather unusual. Many specialists, however, prefer to soak Pea seed 24 hours or longer, pick out and sow the swollen ones, and re-soaking the hard ones, finally chipping through the hard outer coating of what is left after which they come promptly. Germination is usually more prompt and certain when this plan is followed.

Zinnia seed is an example of how a plant's nature extends to the germination of its seed. In cold, wet soil it simply rots. The seed of nearly all flower seed crops germinate much better and with more certainty with some bottom heat. Some require it unless the house is kept around 70 degrees.

During the winter months the seed testing of nearly everything we carry is done in a glass covered box on a bench with steampipes on — just such a box as Rose grafters use. Any grower can easily put up such an enclosure, covering it with a hot bed sash. We prefer to leave some openings in the bottom boards; this with the sash open some, creates a circulation of air which is important. All such seed is sown in flats and a temperature of around 70 degrees is maintained in this box, or seed incubator, as we might call it.

For all small seed it is important to use light sandy material that is further made porous with some peat moss. We prefer to pulverize this by hand; if run through a fine sieve, it tends to pack after watering. If soil is not light and open, the surface becomes hard, leaving it difficult for the roots of some fine seed to bury themselves into it so that they sometimes perish as they germinate for this reason. This might be especially true with seed that requires two to three weeks to germinate.

Both the soil and the flats should be made perfectly level to prevent moisture draining to one side, leaving it unduly wet and the other too dry. Every experienced gardener has noted irregular germination in flats. Frequently the center is slightly rounded and here the seed may be "no good," while about the edges where the moisture tends to settle and remains more uniform, germination is fine.

Lack of uniform moisture explains many failures with very small seed and for this reason, such seed should have the protection of an

enclosed box and if this is kept at 70 degrees for most fine seed, especially of pot plants and including Petunias, you will have no failure with a responsible seedsman's seed.

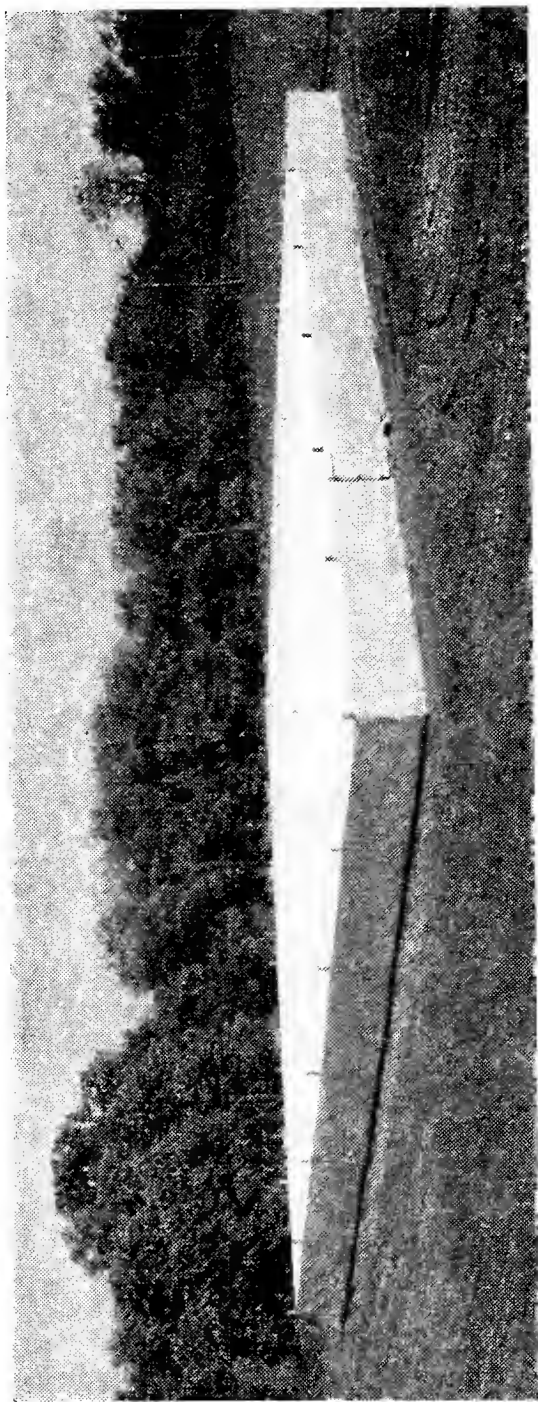
The New Aster Culture

THE out-standing contribution to our business in this generation is what we have chosen to call "The New Aster Culture." It will do more than return the Aster to the position it once enjoyed; it not only adds a factor of certainty to its culture, but it develops greater possibilities in fine flowers than we ever enjoyed. When we consider the cost of the cloth houses and the certain amount of danger of their destruction by storms, we foresee a limiting factor in production that will greatly hold down the senseless over-production of the past. Good Asters are such a valuable summer cut-flower that it is not to be wondered at that we sustained losses year after year before we gave them up; and with the thought of those losses we hardly wonder that growers tend to be wary about rot resistant strains and freedom from "yellows." Yet these are thoroughly established facts.

The working out of the resistant varieties was a heartening accomplishment for it points the way to improving strains in other lines and building up their resistance to various diseases. Its value lies in its simplicity for it merely consists of selecting and developing specimens that are free of the disease from among infected ones. However, there seem to exist various varieties of this rot and this suggests that a highly resistant strain of Asters might not be equally so everywhere. When this happens, there is nothing left for the grower to do but to select his own strains that will be resistant to the local form of infection. While the selection of stock to resist disease has limitations, we believe a great deal is waiting to be accomplished along these lines. It is a sort of "Survival of the Fittest" principle thru which all flower seed lines are being continually built up.

The other serious enemy of the Aster, the "yellows," is a very virulent disease commonly found on much outdoor vegetation. It is too strong to be bred against by the selection method. A small insect known as the leaf-hopper is solely responsible for this infection which is done through contact. This fatal disease is entirely overcome by effectively barring the hopper with cloth houses. In addition to overcoming the "yellows," cloth houses make an effective barrier against the chewing black beetle that so many growers have considerable trouble fighting.

It is a well-known fact to experienced Aster growers that this crop



Isn't this a nice lay-out? Sheltered by trees in the background makes it ideally located too. There are other crops besides Asters that enjoy some protection from the burning effect of summer sun and wind. The only profitable Mums we grew the past season were Gold Lode under cloth late in September. We further protected them with sash—much finer than indoor stock, a week earlier and cost less to produce. A cloth house is an ideal place to grow mums for black cloth shading. Zinnias sown in this house June 1 will flower late July and if sown July 1 they will come in mid-September. The seed should be drilled in rows spaced 8 inches. We have seen *Statice Latifolia* in much finer shape under the protection of cloth than when exposed to the full sun and wind of the open field.

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enjoys some protection from the strong sun of summer. The unbroken sun seems to harden and restrict the growth, for under cloth it becomes more luxuriant and longer-stemmed without affecting the size of the flowers;— in fact, it seems to enlarge them. This alone, we feel, justifies the cost of the houses.

The first point to remember in considering a cloth house is to locate it as nearly as possible in a sheltered position for an unbroken wind will sometimes mess it up badly. The shelter of trees or surrounding hills is ideal but a greenhouse or building of any kind will break the force of a wind.

The site for growing any out-door crop, especially such a valuable one as Asters, under cloth, should be plowed and worked the preceding summer. This not only puts the soil in fine tilth, but it destroys soil insect life that is sometimes disastrous to Asters. Grub worms, if in the soil, seem to be waiting for young Asters; they are especially plentiful in old sod. Ants will nest in old stumps or rubbish of any kind and are particularly obnoxious through their practice of carrying aphids down to the roots of Asters. When plants become yellow and dwarfed, this parasite should be inspected. Anticipating them by scattering the ants is effectively accomplished by cultivation and so there are several reasons for early preparation of the soil. But if this has been missed, we should not hesitate to use land that has been kept clean by the cultivation of a crop. But don't use a piece of old sod for Asters unless it has been well worked for a season. Asters are not planted early, so don't disturb the soil in the spring until it is well dried.

We might add at this point that Asters will stand a fairly well-enriched soil. Too much well-decayed manure tends to promote a soft growth; but some is needed as well as phosphate. Practically all plants call for a balanced fertilizer and Asters are not an exception.

In the construction of cloth houses certain points or rules have become pretty definitely established. In fact, cloth houses have been in use for 30 years among tobacco growers. After experimenting with various modifications, we have adopted the methods as outlined by the Windsor Company of Windsor, Connecticut. The cloth costs between 4 and 5 cents per square yard according to the amount ordered. Though it is sewed together in a standardized width of 400 inches, it can be ordered in any width desired at a slight additional cost. Also, it is strong enough for but one season; and the suggestion of strengthening it with oil or any preparation is not practical because of the added shade any preparation will produce. On page 14 you will note a photo of the post setting that should be used without variation because the cloth is furnished in standardized widths to fit the 33-foot spacing of lengthwise posts. Do not permit the additional

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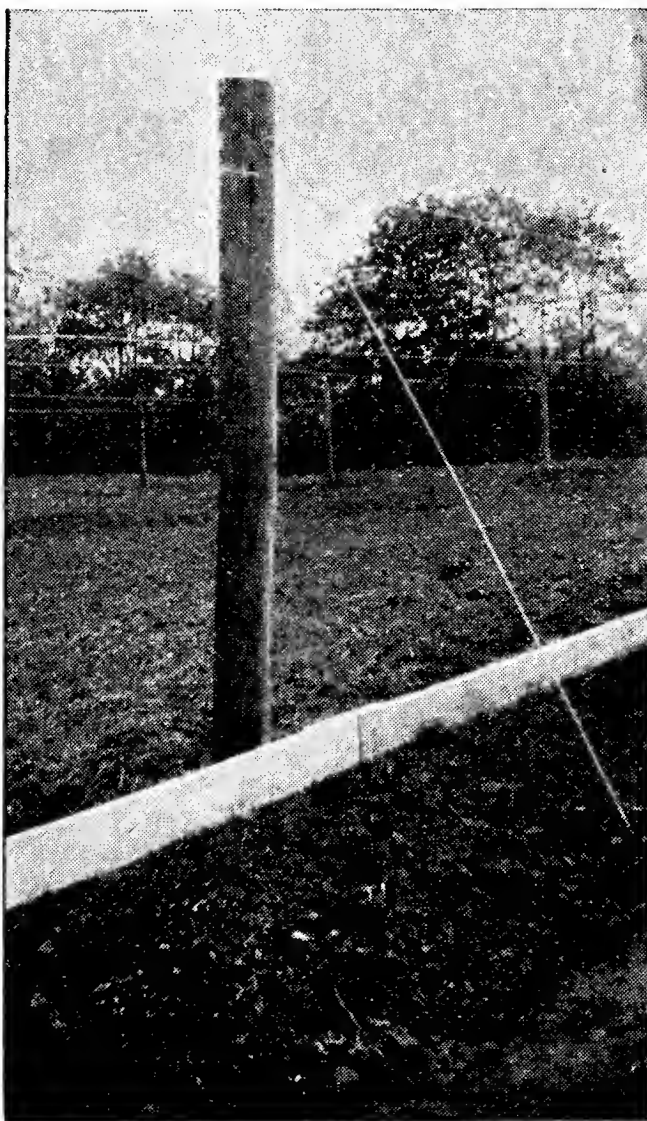
posts about the outside edge to confuse you. They are merely added to support re-enforcing wires. Also note that the wire about the outer posts is attached to the outer side of these posts; this leaves the side-wall or cloth on the out-side of the posts. We should say at this point that, while these spacings are according to standardized directions, next season we plan to double the number throughout the house, adding one between each. This will leave the spacing $16\frac{1}{2}$ feet instead of 33 feet. Cross wires will be stretched between all of them. We plan to sew the cloth to all these wires. The wires should be made just as tight as possible and firmly fastened to each post with two $1\frac{1}{2}$ " galvanized fence staples and we will attempt to maintain them tighter. This change in construction is made to prevent the wide disastrous play the cloth has in high winds. It is very important to set all posts straight in line in both directions. Any variations will make it impossible to properly fit the cloth to the post spacings. Posts should be $10\frac{1}{2}$ or 11 feet long, set 3 feet in the ground and all outside posts must be securely anchored. This is most effectively done by digging a 2-foot hole about 6 feet from the post. In this hole is buried a substantial piece of timber about 2 feet long to which is attached the bracing wire of the post. It is a mistake to drive a post in the ground on a slant and attach the bracing wire to it, as we formerly did, for the bracing post will surely loosen. We use No. 8 galvanized wire throughout and firmly attach to all posts with two $1\frac{1}{2}$ -inch staples driven about all the way in. Galvanized material only must be used, for the rust that forms on ordinary wire will wear through the cloth wherever it contacts it. Wires are attached to all **outside** posts 6 feet from the ground and on all inside posts 7 feet. A wire stretcher must be used on all wire and the outside posts braced before any tightening is done. All wire must be absolutely tight and maintained so throughout the season.

The cloth regularly furnished contains 22 threads per inch and is well re-enforced.

Damp or wet weather, as the September varieties are flowering under the regular Aster cloth, will sometimes spot them with rot, due of course, to the softened growth. However, this is prevented by cutting the flowers in the half-opened stage. We have never received a complaint on the holding-up of cloth house Asters.

To continue with construction notes, a quiet day must be waited for to sew cloth to wires. The first step is to lay out the 400-inch wide top cloth on top of the wires between the first and second row of 33-foot spaced posts. Then lay out the side wall cloth on the ground and you are ready to sew one edge of the side wall cloth and the edge of the top cloth to the first wire. To do this, place both together and wrap about the post several times to form a cushion. This wrap is held in position on the wire with clothes pins or nails and should be

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Substantial Posts, well set, are very necessary to withstand the strain of high winds

to end wires until both edges are completely sewed to the wires. The side wall cloth on ends is put on last. The lower edge of all side wall cloth is nailed to the 6-inch base-board with lath. The slightest air-movement keeps the cloth continually waving and for this reason, if it contacts with any rough or sharp object, a tear will quickly develop. For this reason smooth posts should be used. When small tears show up, and they will through the summer for various reasons, **we find them most effectively repaired by sewing a piece of cloth over the tear. All tears should be patched at once.**

The entrance to a cloth house is important because of the danger of the leaf-hopper gaining entrance. The precaution of building a

followed up with sewing. We use a bent grain sack needle with 12-ply cotton twine doubled. About a 4-inch lock stitch should be used.

When a quiet day presents itself for this work, we put all the men that can be used to advantage on this job. The man pinning on the cloth is followed by another sewing and after they are well started another pair starts on the second section of cloth. This is laid out between the second and third lengthwise wires. The edges of both pieces of cloth are rolled about the second wire and the sewing proceeds as on the first. In pinning the cloth to the wire, it should not be stretched very tightly lengthwise, but some stretching will be necessary to make the 400-inch wide cloth reach across a 33-foot spacing. It is important to keep the 12-inch cross re-enforcement threads at right angles to the wires. Watch this point carefully or the cloth will gradually fail to reach on one side and do not sew the top cloth

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"All posts should line up perfectly, or your cloth will not come out right."

vestibule for the door might be a worth-while one. We have found a well-fitted door with a spring to assure it against being left open, all that is necessary, but nothing short of this will do. Keep ever in mind that the "public enemy" of the Aster, Calendula and some other plants, is the small leaf-hopper that transfers the fatal "yellows" from out-door wild vegetation and that if an infected one gets into the house from nearby infected vegetation, much damage will result. For this reason, the immediate location of the gate should be kept clean of all weeds. When used for Asters, cloth houses must be up and fully closed in all around before planting them. This is important for the reason that the infection of the plants by the hoppers can occur as soon as outdoor vegetation gets under way.

The past season our cloth houses were ripped into by two severe storms during July. We, of course, lost no time in making repairs but some "yellows" showed up about the damaged areas. We might add at this point that four to five weeks is required for the first symptoms of "yellows" to appear from the time the hopper stings the plant. In other words, if a rip occurs in your house within three or four weeks of the time of blooming, repairs are not necessary, since the "yellows" will not show on the plants until after the flowers are cut.

It should be of interest to note that all costs in making these repairs totaled about \$25.00 each — not a serious matter considering the value of the crop and the size of our houses. We should also note that a supply of 6-foot wide cloth is held in readiness to help out in these emergencies.

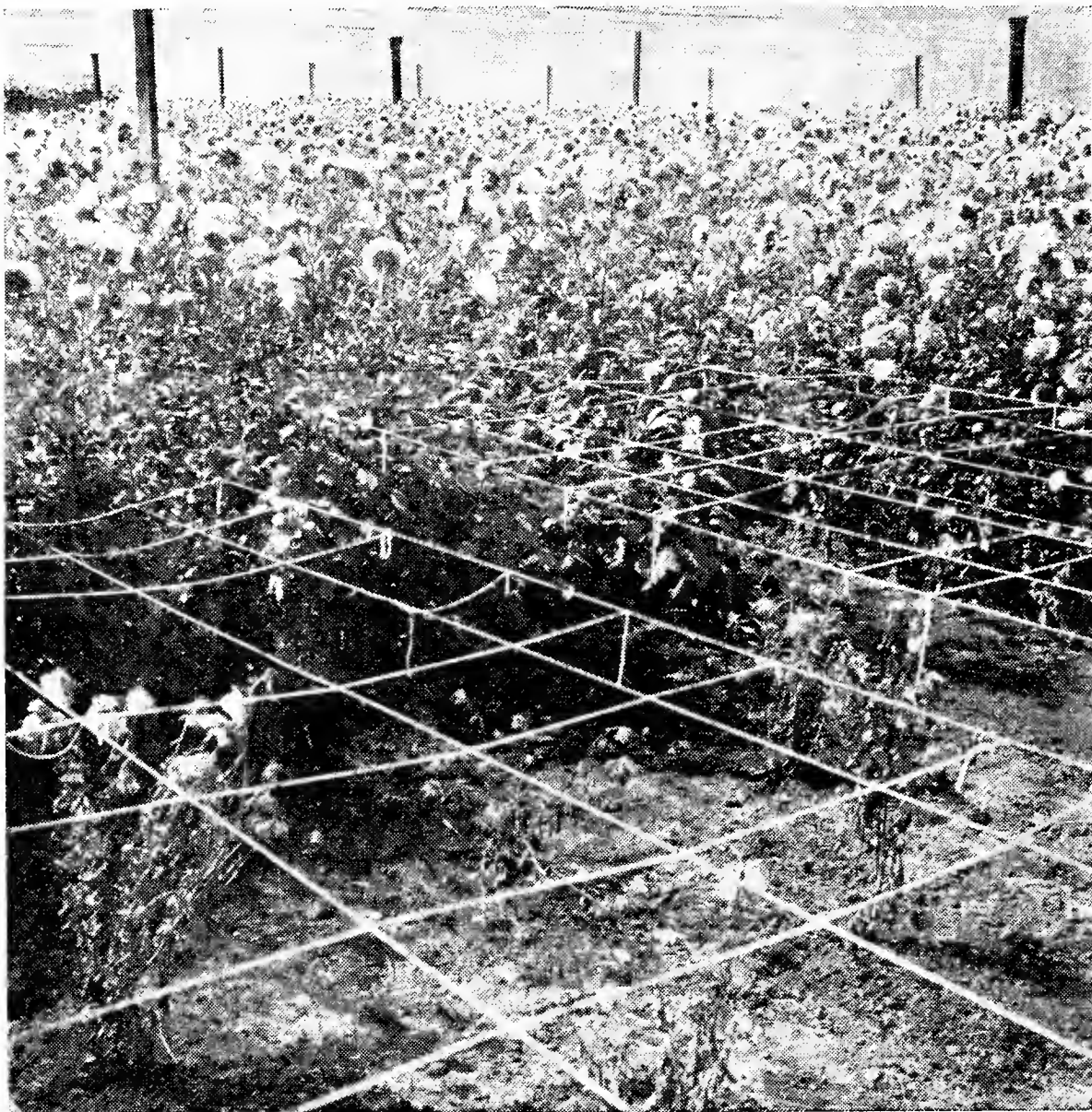
Our total cost of construction the past season was about 1¼ cents per square foot of ground space covered. This will, of course, vary in different sections but should not greatly. The wire and posts can be salvaged and this reduces the cost for the following season. Furthermore, we have been using the same site for our Asters for the past 3 consecutive seasons and we find the rot-resistant varieties hold up well though the soil is thoroughly sick. This is evidenced by the fact that non-resistant strains go down badly — some are burnt out by mid-July. Our houses are largely used for breeding and testing resistant strains and for this purpose our sick location is necessary. For regular cut-flower purposes and when the resistant strains are used, we do not hesitate to recommend the use of the same site for two consecutive seasons. During the season of 1931, we found these houses quite profitable. Last season, we, of course, did not come out so well, but still showed a profit on the flowers cut alone; in fact, these Asters were about the only item we grew that kept out of the red, and we use a cost and profit-finding system on all crops grown.

We have much confidence in the future of Aster growing in cloth houses and we do not share the belief that it will be overdone. Ambitious farmers of the past killed the Aster business by putting out 5 and 10-acre fields of them, it is true. The cost of the cloth house together with the danger of their destruction will, if plain sense will not prevail, put a curb on the senselessly foolish practice of producing more of any flower than can be sold with profit. Furthermore, we believe that the present state of business will teach, at least the present generation of growers that it is far better to intensively produce a fine grade of stock on a limited area. Disbudding, watering, supporting and cultivating all involve considerable work, when well and properly done; and when a grower with a few helpers takes good care of a cloth house, say 99 by 150 feet, as we did the past season, he or she will be busy. It almost invariably happens that the larger our planting of a crop the more the quality suffers. And it **invariably** happens that the greater the quantity shipped to market, the lower the returns.

GROWING ASTERS UNDER CLOTH

We formerly sowed our Aster seed about March 15 and transplanted the seedlings into an outdoor frame. This made extra labor besides giving the plants several severe checks in transplanting. Now we sow about April 15 and transplant direct from seed bed to flowering beds.

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It is most encouraging and convincing to see Resistant strains stand up nearly 100% in thoroughly sick soil, as shown above, alongside ordinary commercial stock that goes down nearly 100%. But we do occasionally get complaints on them, surprisingly few though, considering the number of favorable ones. In several cases we looked into, we found the plants affected with "yellows" and one was in a cloth house. This showed up the importance of maintaining such houses 100% tight to bar the leaf hopper that alone is responsible for the fatal yellows.

With this plan the seedlings grow on unchecked by backward spring weather and the overcrowding and rotting out they formerly suffered from.

We could go a step farther with this plan and sow in flowering beds, avoiding all transplanting checks but this could not be done with Asters until about mid-May, resulting in a comparatively small plant at flowering time. But the increased vigor of the seedlings with this plan would make them more immune to any form of disease. We once planted a greenhouse bed with Asters, but failed to finish it through lack of plants. The bed was filled by sowing the seed direct. By mid-summer the difference in vigor was very noticeable but it was rather remarkable to find the transplanted plants badly overrun with red spider and daily syringing was necessary; adjoining them the stock that was not transplanted remained entirely free of spider to the end! **This is a significant example of the effect on plants of a check in growth.**

The growth of Asters can also be disastrously checked by starting them too early. We once made a sowing February 15 and planted in the greenhouse March 25. They made a most promising growth until about July 1 when the fully developed growth slowed up apparently waiting for their blooming season which was September. The standstill in growth tended to weaken their resistance for all the forms of rot Asters are heir to set in. We got some weak flowers but they were not nearly so valuable as was the information that Asters have their flowering season and this cannot be substantially changed except perhaps by the use of electric lights. If started quite late and the sowing made where they are to flower, the growth will be uninterrupted and fine but of course not so large and long-stemmed when they reach their flowering season as a sowing made earlier. It will be just such stock as the amateur gardener produces from seed but much better than the florists' early-started plants that are usually carried away by rot.

We find April 15 a safe date for sowing our main lot of Asters for cloth houses. The Queen of the Market class might be sown a week or two earlier. Even the late California Giants go in with our main sowing which should be made in the greenhouse. A frame will do if protected from "hoppers" with cloth; the seedlings will come on slower in a cold frame and should be sown a week earlier. To avoid over-crowding, the seed should be evenly spread, allowing about 75 square feet to an ounce. A medium size flat will care for an ordinary trade packet of seed. An ounce of seed carefully sown and evenly covered should produce 5 to 7000 plants. In our latitude, planting out can be safely done around May 15 to 20th, especially if the plants can be somewhat hardened. If they are quite soft and are hit the next day or two after planting by a heavy frost, they will have little

chance of pulling through. The earlier the planting can be done after May 15 in our latitude, the better.

We handle our cloth house Asters just as we do when planted in the greenhouse, spacing them 12 by 12 inches, and leaving out every seventh row for a walk. For some late, or September flowering, varieties we provide two sets of wire and string supports, setting the first one 12 inches from the ground. Though the protection of the cloth prevents the rapid drying out of the soil the open field is exposed to, we find it well to water under cloth nearly as regularly as when planted under glass. We find that the rule of watering thoroughly and not so frequently is not so favorable to Asters as is going over them every day or two, especially during dry weather. The inside of a cloth house is nearly as much exposed to air movements as is the open and the temperature gets almost as high. This creates a dry atmosphere that is made much more refreshing and favorable for plant growth by frequent watering. Besides Asters are shallow rooting comparatively speaking, and this class of plants calls for frequent watering.

Another point in connection with watering is the danger of red spider, especially when hot dry winds are blowing. This pest is held down some by maintaining a moist atmosphere but it must be watched for and if it gets started, the grower will have a fight on his hands with the hose and a good water pressure as his only weapon. Another serious Aster disease that sometimes develops, especially in the South, is a form of rust. Last season we were rather severely hit by it in both the black and orange form. Our Peonies were also affected by some form of rust. June and July with us were quite moist and warm and we are inclined to attribute its start to this excessive moisture condition though it did not show up severely until late August. We do not believe that moisture through watering freely during dry weather encourages it. By promoting a vigorous growth, it might even help the plants in warding it off. However, we advise being careful to water only during really dry weather. There are reasons to believe that cloth house conditions combined with excessive atmospheric moisture encourages its spread. Like rust on grain or Snapdragons, there is really nothing gained by destroying the spores when an outbreak is under way. All we can do is to set up conditions that do not favor its spread and maintain our plants in as vigorous or resistant a condition as possible.

GROWING ASTERS UNDER GLASS

Though grown better and more economically in cloth houses, splendid long-stemmed flowers can be grown under glass. Greenhouse space might easily become available during summer months that can be used to advantage with this crop, especially when a limited number



House of our improved strain of Ball White Early, orginated by us 30 years ago.

are wanted for a retail business and where the space should be clear for a winter crop during August or September. Greenhouse conditions on either raised or ground beds promote growth and stems in Asters and where they can be grown free of "yellows," they are a paying summer crop. Our greenhouses are in the country and surrounded more or less with wild vegetation that becomes infected with the "yellows"; for this reason we lose our greenhouse Asters heavily with this disease though we screen side ventilators and lock end doors. Though the ridge ventilators are 20 feet from the ground, we believe the disease-bearing hopper is carried through these vents by the wind.

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Where the immediate neighborhood is free of the disease-bearing vegetation, there should be little or no trouble with "yellows." And when Asters can be grown under glass free of it and stem-rot they should be a profitable summer crop. If the resistant strains are used it is not at all necessary to change soil for them though stem-rot is a soil-borne disease. In fact, the accumulated fertility in used greenhouse soil will usually produce much better Aster growth than will fresh soil.

Aster growth is strong and rank and for this reason the soil should be well manured. We add a concentrated, balanced fertilizer as a top dressing about the time flower stems break out. The same cultural details suggested for the cloth house crop apply under glass, unless we except the fact that, during a hot summer, it might become next to impossible to hold down red spider if they get as little as a toe hold.

A few words about topping: We generally prefer not to do so because the main or central growth produces the earliest flower. If this growth is broken out as the laterals break from about the base, more of the plant's energy will be concentrated in the breaks. It really makes no practical difference which course you choose for neither will affect the amount of energy the plant has to use. The point that does count is to have plenty of material in the soil for the plant to feed upon and to have enough moisture there to set the fertility free. Be sure to get supports up timely and when the buds set on the end of flowering stems it will be time to disbud the laterals from these stems.

THE BEST VARIETIES

This is a question that frequently comes up in connection with cloth or greenhouse growing. Under these conditions the results do not differ from ordinary field culture except that the quality is improved — longer stems and larger and better-finished flowers. All varieties react alike to the better culture. We might briefly describe the principle classes.

Early Wonder. Sometimes known as Early Express and similar to early Hohenzollern. Almost too early flowering to be large or long enough stemmed for commercial work but makes a nice showing if growth is unchecked. An early May planting will flower late in June. Should be used only under favorable growing conditions. Comet type flower.

Queen of the Market. The standard early flowering class. Two colors, dark blue and crimson, have been bred for resistance to stem-rot. All others are as yet weak in this respect. A mid-May planting will flower in late July.

This represents the California Giant type of asters. It might also illustrate the Ostrich Feather or Cregos and the Astermums as well. The last named is the earliest and the "Giants" the latest of this attractively formed class. We should note, however, that this form is not popular for long distance shipping. The more incurved type of flower stands knocking around better.



Early Royals. Closely following Queen of the Markets. The later flowering varieties with more time to develop, naturally produce longer stems and larger flowers. The spread in size between Early Wonder and California Giants is striking and the increased size and stems we get in the Royals over Queen of the Markets clearly illustrates this. The Royals are responsive to breeding for resistance for we have a number of colors that are fairly strong in this respect. A true Royal should flower around mid-August but we have colors under this heading, notably some strains of Shell Pink, that run well into September.

American Astermum. Comet type that is with us the last days of August. A fairly resistant-bred white is available in this class.

Ostrich Feather. Improves the Astermum class in size and petalage.

Crego Giants. The true type improves the foregoing Comets in size and fluffy effect. All in this class are attractive for the retail grower but not popular with the market grower because they do not ship so well as do the more regularly formed types.

King or Needle Type. Narrow, pointed petals with a distinct

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and attractive effect. Flowers hold up well in long distance shipping. Of upright growth except rose and violet colors that are branching. We find it difficult to breed resistance into this fine class but strains of crimson and blackish blue are fairly so.

American Branching. The names of a number of seedsmen are prefixed to fine strains of this type. The important point in this connection is not so much the name of the variety or class as the care that has been used in roguing the stock for true types. The finest all-purpose type; mid-season flowering.

American Beauties. Closely follows the American Branching class. Fine size, distinctly incurved and long-stemmed with some non-lateral tendency. A fine class for cutting.

California Giants. The "Giants" are the crowning achievement in American Asters. We have shipped them with good Gold Lode Mums and received equal returns. Generally found very susceptible to stem-rot and as yet no resistant strains are available. Their late-flowering habit, about October 1 in the Central States, leaves them liable to damage by early frost unless started fairly early.

OTHER CROPS

Our experience indicates that Asters will respond more profitably under cloth than any other crop. However, we have the past season grown some choice Dahlias and, contrary to our expectation, they were not softened by this protection. They were exceedingly fine. In fact, the color and length of stem of most summer crops is benefited by the protection of cloth that not only shelters them from the intensity of the sun and wind of summer but from ravaging insects as well. This should make at least a moderate size cloth house a necessity for any well-appointed retail business.

Winter Peas

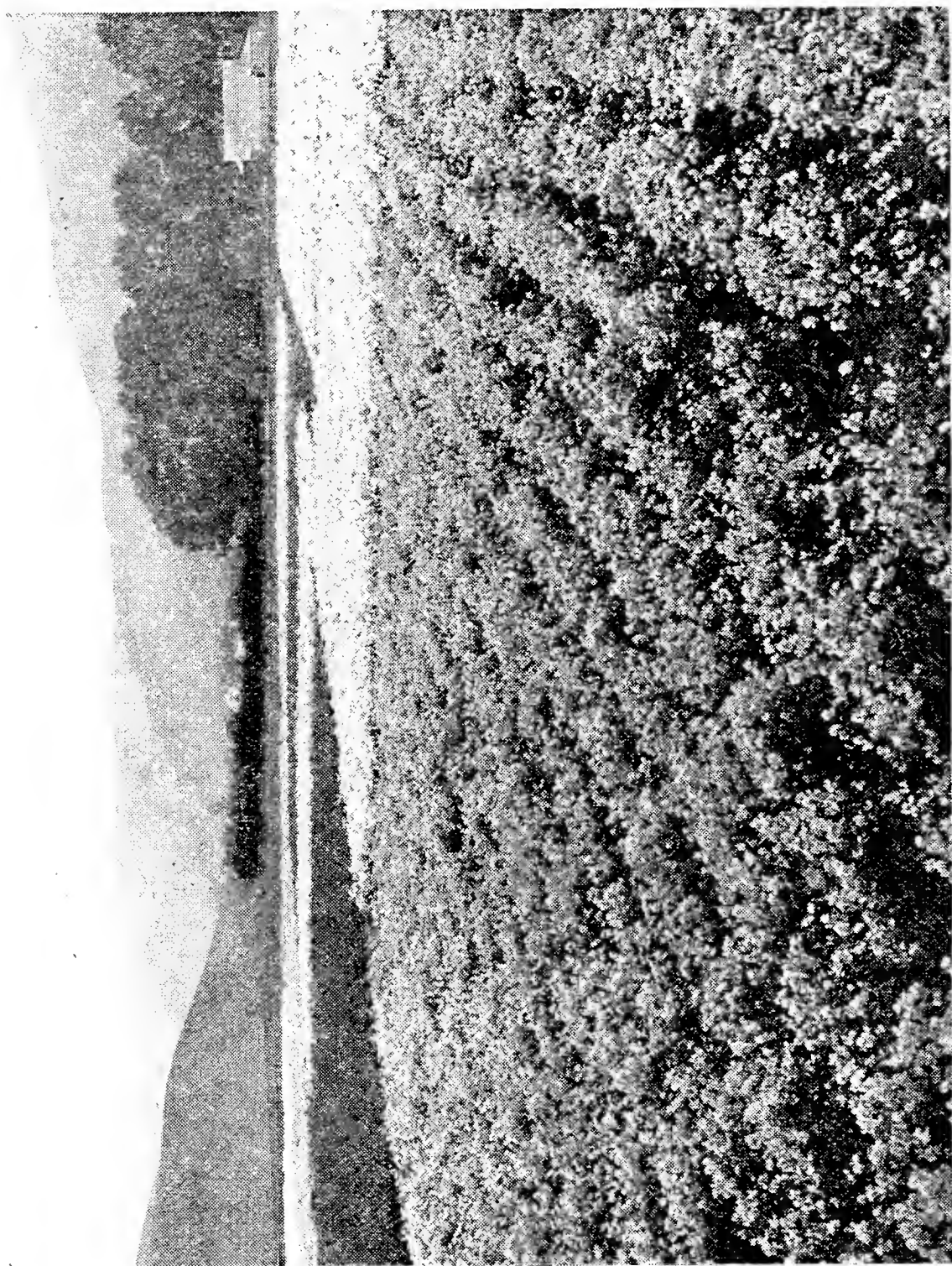
BECAUSE of the exceedingly free flowering habit of Sweet Peas when favorably conditioned, the early or winter blooming class remains today a most profitable cool greenhouse crop. There is one very common reason for failures and as the season approaches for consideration of the earliest sowing, a discussion of this and a few other points of interest should be timely. It should be welcome as well, for a retail grower particularly, cannot afford to be without Sweet Peas thruout the season.

We feel perfectly sure in the statement that rot in the soil is responsible for most sick Peas. This, of course, means that the fundamental requirement is clean soil. Steam sterilizing, if carried out carefully, will make it possible to do fairly well with used soil. If steam equipment is not available, drenching of the soil with hot water produces encouraging results. We believe this is accounted for by the less intense and more uniform distribution of the heat. In the use of steam it too often happens that part of the bed is overheated and part of it does not get enough. If hot water heating is used the water is drawn from the circulating pipes and applied with a 1-inch steam hose. With steam heating, hot water can be piped to the houses from the blow-off of the steam boiler. It is, of course, important that the soil be drenched thoroly to an effective depth and before applying the water, the soil should be well dried. Immediately after applying, the beds should be covered closely to effectively retain the heat.

Not only the lower invisible forms of soil life are destroyed by heat, but eel worms as well. These worms are a serious and widespread pest especially in southerly sections. They make themselves comfortable in the roots of Peas, multiplying rapidly, thereby causing swellings thru which their presence is manifested. The outward symptoms of nematode or eel worm attack are lack of vigor, gradual hardening and production of short-stemmed flowers. After the vines have been producing freely for several months they gradually and normally harden; but when they are but 3 or 4 feet tall and this happens, the presence of these microscopic worms may be suspected. The time to do something about it is before planting by being certain the soil is clean.

SHALLOW OR DEEP BEDS

Are raised or solid beds preferred? Fine Peas can be grown by either system though we should not use shallow raised beds with light or sandy soil. There isn't enough body to it for such deep, strong roots as Peas produce. On the other hand, where good retentive soil is available and it seems hopeless to grow good Peas on the ground, we



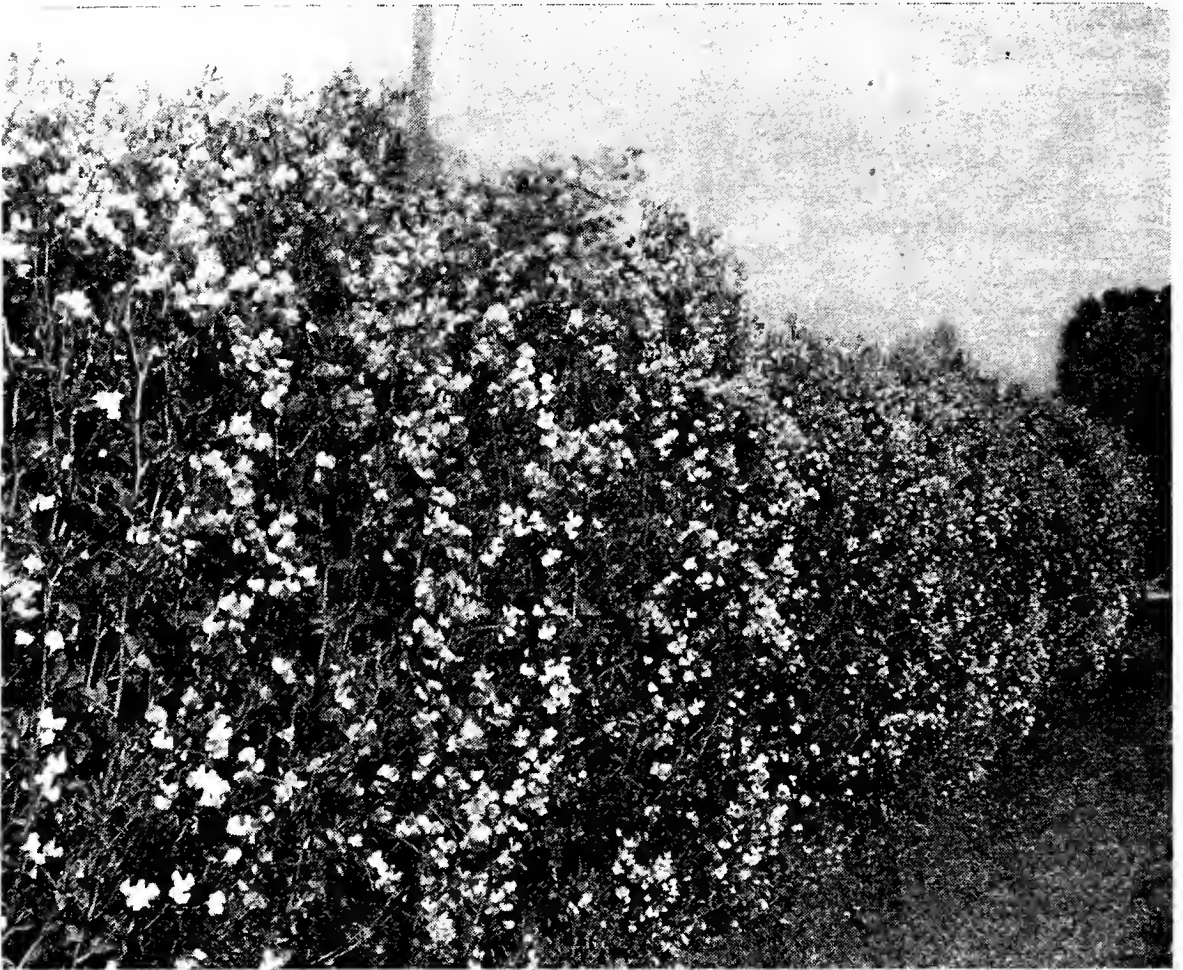
Winter Flowering Sweet Peas as Grown for Seed in California.

suggest the raised bed. Before filling, it should be washed thoroughly clean with a strong water pressure and then gone over with a hot lime wash. In the use of raised beds, sowing as early as July in our latitude is not necessary nor advised because during very hot weather there is greater danger of burning out in these shallow beds. As the weather cools and growth gets under way, we come to the real advantage of raised beds. In their comparatively shallow soil, growth can be controlled and hardened at will and this to a large extent controls bud dropping. On the other hand, in the deep ground bed, though drainage is perfect, growth is sometimes difficult to control and bud dropping results unless the growth has been hardened through very early planting. However, most specialists use ground beds. In a well ventilated shaded house the earliest or mid-winter flowering crop of Peas in ground beds should be sown early in July in our latitude. This sowing calls for clean or fresh soil, not much manure and maintaining the soil only fairly moist. This sowing gets in full crop on fairly long stems by October 1. We have sown as early as mid-June and had them in full crop September 1, but the growth becomes hard, producing rather short stemmed flowers freely and the crop is usually over by Christmas, not getting over 8 to 10 feet tall.

Keeping the growth of the July sowing in control in deep beds, especially during the short days of November and December, calls for good judgment in watering. Even in our well-drained beds we apply little or no water from early November to Christmas week. A good soaking at that time with the soil well dried, greatly encourages the Christmas crop. As the growth of the early planting hardens in January and especially February, there is little danger of overwatering a ground bed of Peas and the life of the plants on a raised bed during January and February will be largely in proportion to the amount of water they receive. It is, of course, impossible to make exact suggestions for watering during November and December; much depends on weather, soil, and drainage, but don't forget that a somewhat hardened growth is necessary for flowers and to produce such growth calls for judgment in watering, — the condition of the soil throughout must be considered.

EARLY AND LATE SOWING

The early started or winter crop will do well to hold out in good shape for Valentine's Day, though if sown in August and not pushed hard, it might be in fair shape for Easter. By early March their place should be taken by the planting after early Mums and if this later planting is grown cool, as they should be until buds set, it can be counted on for long-stemmed show flowers — the kind that bring out all the fine colors and forms of the early class. Another nice thing about this late planting is the comparative ease with which it is grown



The Possibilities of Early or Winter Peas outdoors as demonstrated at Orlando, Florida. This fine class so largely grown by Florists from Florida to Alaska are the most Profitable cut flowers we have.

for it gets its start under the ideal conditions of early fall without the weakening effect of hot weather. It is for this reason that the various forms of rot that flourish in high temperatures are not nearly so destructive to this later planting. This makes it usually safe to use 2-year-old greenhouse soil. Also because they do not produce the very tall heavy growth of the early planting, we space the later planting closer — usually 3 rows together in place of the double rows.

— There is a difference of opinion as to the proper spacing of Peas; some very good growers use single rows and allowing 4 inches or more between the plants. Under conditions that produce very heavy growth, there might be an excuse for this. But such a growth should not be permitted because with it goes a softness that will not hold buds and if it goes too far it will not even permit their formation. This is,

of course, not a problem with the early summer sowing. It becomes well hardened and gets into flower by October. But as the later sowing gets into bud, it is important to control and harden the growth through the watering as suggested for the mid-winter crop.

SOWING SEED

We are finding that better and more prompt germination can be had by soaking sweet pea seed 24 to 36 hours before sowing. This will swell most of it, proving its viability. The few that remain hard do so because of the extra hard outer coating. They can either be picked out and re-soaked or the outer coating broken through with a knife or file and sown. This will permit them to germinate promptly. The sowing should be about an inch deep in fairly moist soil and no water applied until the seedlings are well up. A mid-summer sowing should be protected with straw or boards to keep the soil cool and prevent undue drying of the surface soil.

Mildew and other fungous diseases usually attack Peas under greenhouse conditions and do more harm than we might realize for the destruction of any good leaf on a plant is a loss. Sulphur must be used with caution on Peas for they burn easily. Before they get into much of a crop we keep our vines well dusted with clear sulphur and after they are in flower it should be used sparingly on heating pipes.

Sweet Pea growers frequently sustain real loss through planting unsuitable colors. The complete color range with all intermediate shadings is available in the early flowering class and many of them should not be considered by cut-flower growers, especially for the early planted or mid-winter flowering crop. For this crop the colors should be confined to the clear, fairly deep pinks — no cream pinks. In point of value, the lavenders come next with a limited amount of white and blue. The orange colors tone down rather light under mid-winter conditions. Our market calls for some of this color, referring to it as salmon. The extra long stemmed cerise variety, Early Pride, also the lighter cerise, Sunray, are fairly good under normal winter sunshine; both are fine for the later planting.

FOR OUTDOORS

In Florida, especially the southern half of the State, only the early flowering class should be used and they do surprisingly well under favorable soil and moisture conditions. This class will also produce heavily outdoors in the central states if gotten in early and watered as needed. But the flowers are short stemmed and the vines weaken rapidly with the coming of hot weather. Along the Canadian border we have noted the earlies in heavy crop in September and in as fine shape as were the late class in an adjoining row and they, of course,

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enjoyed the advantage over the late class of earlier flowering. Another and a valuable crop, we find, in our latitude is an outdoor sowing around June 15. This is made under the protection of a cloth house and is spaced rather close, three rows together, as recommended for the after-mum sowing indoors. Under our conditions, they do not get up over 4 feet. This sowing gets into flower late in August and continues until cut down by a heavy frost. The flowers are fairly long-stemmed and during September are accepted in our market at around 50c per 100. They must, of course, be watered and supported as you would the greenhouse planting. We believe aphis the cause of many failures with the early sown crop, both in and out-doors. If surrounding vegetation is affected with mosaic disease, aphis will transfer it to the Peas. This disease has a mottling effect on flowers and foliage from which the plants never recover. And if this disease is not present, aphis increase so fast in a high temperature that they soon draw the life out of the plants. We find it necessary to spray every ten days and with a strong solution of nicotine.

The past July we sowed twelve beds with early Peas, preparing each differently for experimental purposes. They were divided into 4 sections of 3 beds each. In one section the soil was replaced with fresh; in another the old soil was used and the other two sections were given over to various manure experiments. One bed of each section was steam sterilized; another saturated with hot water and the third untreated as a check. The result in each section strikingly favors the hot water treated beds over those sterilized with steam; and we clearly note that the hot water treated bed in the old soil section is particularly fine. With the plants but 14 to 16 inches tall it is, of course, too early to make definite conclusions, but the results at this time are significant and confirm earlier notes we have made on the value of hot water. At the time these results were becoming clearly evident we were visited by Kenneth Post, floricultural instructor at Cornell, and this was fortunate for Mr. Post is working on the cause of the poor behavior of Peas during the earlier stages of growth. His explanation for the root rot that is so common, especially in old, heavily manured soil, concerns the excessive accumulation of nitrogen in the soil. This burns the newly forming roots resulting in rot with the familiar lack of vigor in the growth. When the soil is saturated, according to Mr. Post, the excess nitrogen is washed away, leaving the top soil clean for the newly formed roots. This suggests the importance of limiting nitrogenous manures for the newly started crop of Peas and perhaps depending on inoculating the soil. The question arises, Can we not use cold water as effectively as hot for washing down the excess nitrogen? Perhaps we can, but this would miss what sterilizing effect the hot water possesses as well as possible chemical changes in the soil. This question can, of course, be easily

settled. We greatly appreciate Mr. Post's explanation which seems a logical one. It provides a reason that seemed needed to add plausibility to hot water sterilizing.

Summer or Late Flowering Peas

GROWING the late flowering type of Peas in pots for home gardeners is more profitable and satisfactory than is generally appreciated. There are two reasons for failure with out-door Peas — greenfly and failure to start early. The plants must, of course, be sold to the customer perfectly clean and with directions for keeping them so with Nicotine spray that should be applied regularly until they are in flower. Nothing is more easily produced than a 3-inch pot plant with 3 seedlings in it and when this is started in February, strong bushy plants can be had by late April when they can be planted out in this latitude. Some strawy manure should be lined up alongside the row in readiness to protect them from a frost. It is important to get them out early to enable the roots to become well established before they flower. Such plants begin to produce early in June with us, and keep at it until the heat of July burns them up. The early start that gives results before high summer temperature sets in is the important point in latitude open to hot summers.

As market growers, we rarely fail to make a profit on a planting of these out-door Peas. For the retail grower, we feel that they should be considered indispensable, for, as we all know, Peas are wanted throughout the month of June, when indoor stock is usually too short and soft. For real results, they should be supported with wire and string as you do the indoor crop. But it is surprising, the results that can be had from no supports at all — just letting them ramble as they do in the California seed fields; the stems stand out perfectly straight under this condition but the growth is somewhat discouraged when their natural tendency to climb is not provided for. The following standard varieties are the best six for commercial cut flower purposes: Pinkie, rose pink; Magnet, cream pink; Powerscourt, lilac lavender; Ambition, rosy lavender; Avalanche, pure white; Glen Eagles, light blue. The following is our suggestion for the second best six varieties but they should be grown in limited quantities for cut flowers: Huntsman, orange scarlet; Welcome, fiery scarlet; Debutante, salmon pink; Blue Flame, dark blue; Olympia, purple; Rosie, rose pink. The commercial cut flower grower should go easy on scarlet and salmon pink though a limited number is acceptable for variety. Our second list will stimulate the home gardener's interest. No clear orange or salmon is included for they burn hopelessly in the sun and shading is not commercially successful.

Stocks

THE outstanding development in Stocks during the past season or two has been a growing recognition of the value of the Column type. This is partly due to our American appreciation of long-stemmed flowers that lend themselves to large decorative effects. But that is only one reason why this type is considered "supremely fine." With all the plant's energy centered in but one stem, the flowers of course, become much enlarged and the one stem more rigid than the branching kind. In our own growing for market, we find, as clearly as figures can prove it, that they are more profitable than even the Bismarcks; in fact, we are told by our market men that it is impossible under present conditions to sell the branching kind when the stately Column class are available.

This type was received from Europe more than 20 years ago, but has not been well accepted here because they were not at all true to the non-branching habit and part of them continue so. But we have a few choice colors that are quite true and when well grown, they are glorious. The Germans recognize two distinct Column types: Giant Perpetual "Excelsior," of moderately tall, rather compact habit, and Long-Stemmed Champion which is decidedly taller and inclined to produce a few weak breaks from about the base of the flower spike, and with flowers not quite so closely set as are those of the Excelsior class, but amply close if grown cold or on a raised bed. We picture a fine example of this class on page 31. This is catalogued as Champion Long-Stemmed white tinted rose and when well grown is superbly fine. There are several others in this class — some of various shades of coppery red whose market demands are limited; one of them, "Chamois with Gold," has an alluring name but unsaleable color, especially under artificial light.

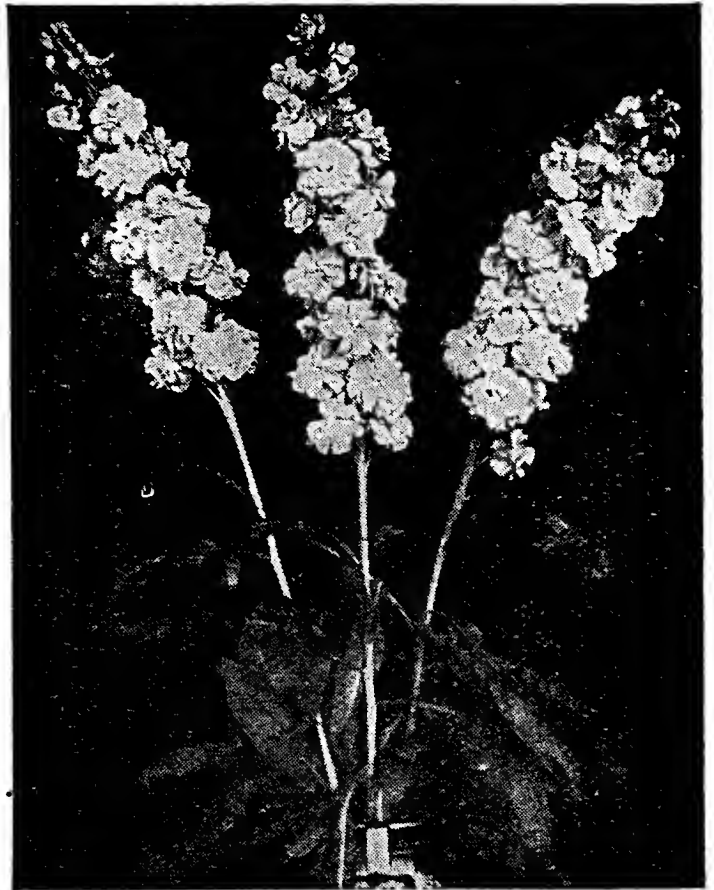
In the Giant Perpetual Excelsior class, Lilac-Lavender heads the list and does it easily for it is bright and live, and a color that makes up with many others in a most friendly manner; and the percentage of doubles should run high. The next best on the list is Chamois Rose, a particularly pleasing golden rose shade; not quite as long-stemmed as the Lilac-Lavender but amply long if well grown. The percentage of doubles in most strains is rather low — around 50 to 55%, but the singles are more valuable than those of other colors, the flowers being closer set on the stem because the variety is of a distinctly compact growth; individual single flowers are also somewhat larger. Ruby, a bright crimson is a heavy but attractive color that is called for but in more limited quantities. Its growth is strong and fairly tall. A number of other colors, notably a clear white and a rose, are sometimes listed under the column heading but are distinctly branching.

The cultural requirements of this class of Stocks does not differ

from those of the branching kind except that the close-planting method should of course be used. We have been spacing the rows across the bed 7 inches and 2 inches in the row, but have decided that, in the interest of more uniformly better flowers, this should be changed to 8 inches and 2½ inches respectively. The most valuable crop is the earliest one that can be had in January by sowing the seed about August 1 and growing cool during the winter months. If sown too early, or if exposed to too much summer heat, any class of 10 week Stocks will come blind and when this happens, they should be discarded for they will remain in this blind condition until exposed to a considerable period of low temperature. The past season we made a sowing March 10, planting out April 1. They came blind, but were left in the bed to see what would happen. They flowered the following February. However, next season, we will get in our first sowing a week earlier than August 1 for we believe this can safely be done in our latitude, but not further south. This planting date applies to both the branching and non-branching class.

Another serious problem for the grower is their susceptibility to stem-rot in the younger stages of their growth and this applies to all classes of Stocks. This is, of course, due to a soil fungus and while we have experienced losses in fresh and sterilized soil, fresh material is safer than soil that has been used in the greenhouse 2 or 3 years.

Last September we planted a bed in soil that had just a year's use and the plants dropped out so badly we decided to give it up. We removed 1½ to 2 inches of the top soil, replacing it with old material from out-doors that had been used and discarded 2 years before.



"BALL STOCKS" Strictly non-branching, long stiff stem and flower spikes, a most valuable type.

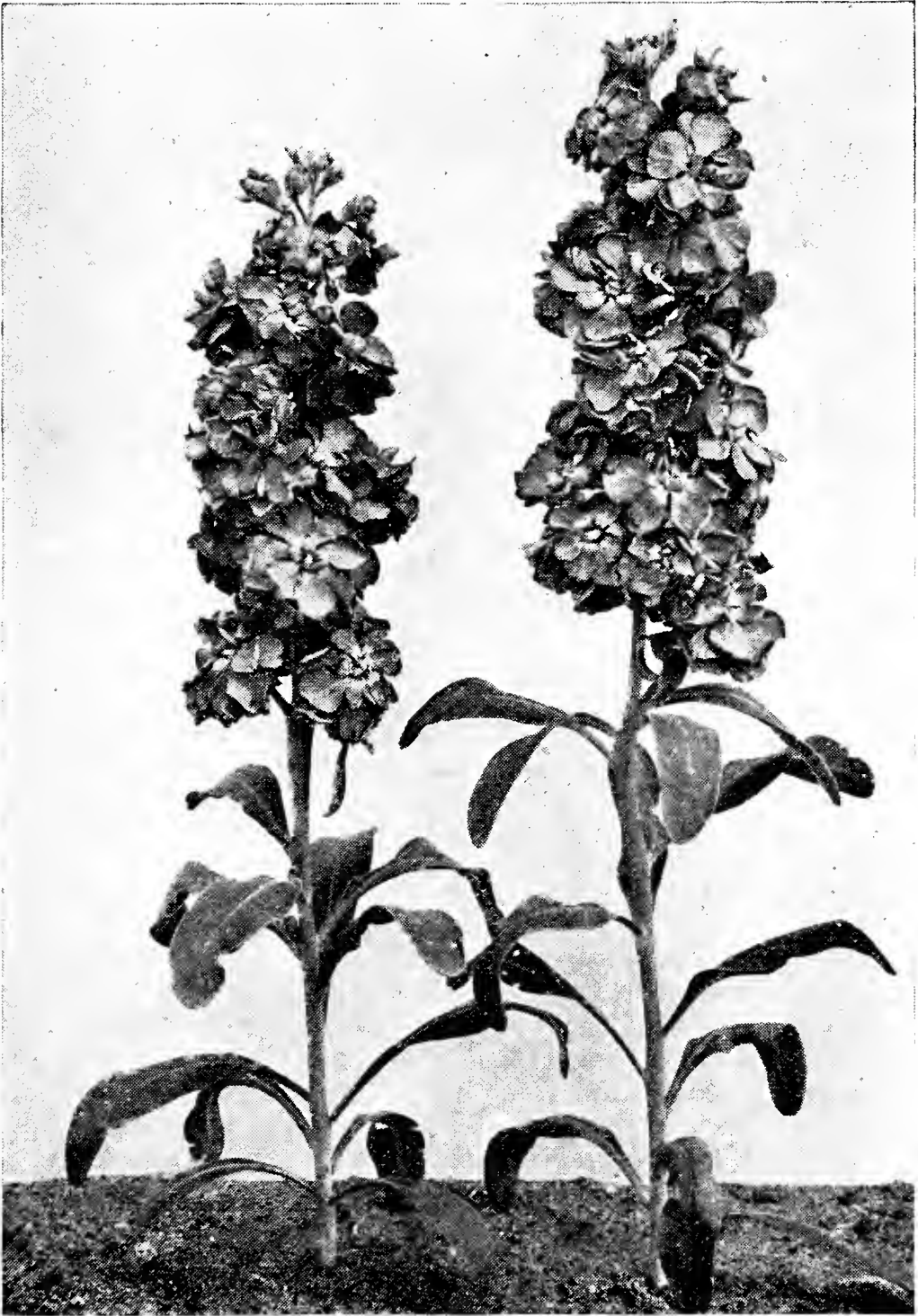
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The Stocks planted in this came on fine with no loss and now, Easter Week, this is in full crop with as fine a lot of flowers as we ever cut into. It isn't much of a job to replace a few inches of top soil and we strongly recommend doing so before planting Stocks in any soil that has been used for as little as one year. There may be sections in which this stem rot is not present, making this precaution unnecessary but if there is any doubt about it, don't take a chance for the sake of the small amount of labor and material involved. I might add that the experience in changing the top soil referred to isn't the first one we have had in escaping this rot.

Here is another soil experience with Stocks that might interest you. Last fall we filled a lot of 3 $\frac{3}{4}$ -inch deep flats with virgin soil from a swamp; we felt that it was ideal for any crop. But our Stock seedlings refused to take to it. After a feeble effort to grow they came to a standstill with no stem rot until we applied a moderate handful of a 6-8-6 concentrated fertilizer as a top dressing to a flat of 15 x 20-inch dimensions. The result was magical and with nothing further than water we developed beautiful stems and flowers from these flats. In the use of fertilizers for experimental work of any kind, we leave an untreated check plot and in the untreated flats of this experiment we were shown the real results of the fertilizer for the untreated flats gradually starved to death. As we see it, this was not due to lack of fertility in the new soil, but the applied fertilizer seemed necessary to unlock what was in the fresh soil.

And this brings us to another profitable note in the growing of these Stocks. Most shallow rooting crops seem to produce a better character of growth on a shallow or raised bed. Strong or deep-rooting plants such as Peas or even Roses will make a more profitable showing in deep soil if well drained. But Stocks in such a soil in mid-winter tend to grow soft and rank and unless run cold, say 40 degrees nights with air whenever possible, they tend to become soft and drawn with flowers spaced out on the stem. Such growth is only partly due to deep ground beds, the principal cause being lack of sunshine. When the non-branching type is planted in deep beds after Mums, they get in flower during the early Spring months or after plenty of sun has got the growth in better balance. They are at their very best at this season. But for mid-winter flowering a raised, rather shallow bed should be preferred and not too freely watered during very dark weather. The past season we planted a considerable quantity of the non-branching kind in 3 $\frac{3}{4}$ -inch flats with fine results, spacing them 4 x 4 inches. They produced 18 to 20-inch stems and, unlike the early deep ground bed crop, the flowers were closely set. Considering that these flats can be moved around as space presents itself, we feel that they are used to very good advantage in this way.

Stocks will stand a rather rich soil. We had this forcibly demon-



This photo shows what can be done with non-branching stocks under outdoor conditions. But we should note that all ten week stocks tend to come blind where summers are hot and dry. When grown under glass the non-branching kind produce longer flower spikes and not quite so heavy as the photo shows them.

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strated in an experiment to determine the effect of poor soil on the percentage of doubles. In this respect no effect was noted, the proportion being practically the same in both soils, but the difference in the growth was a striking demonstration of the necessity of well enriched soil for Stocks, and, of course, that goes for practically all crops. If the growth of Stocks is at all weak or lacking in a rich green color, a balanced concentrated fertilizer should tone it up and add vigor to it. But don't mistake stem-rot for the effect of poor soil, this rot gradually eats into the stem, shutting off life to the plant.

Stocks are a cool house crop. A very nice grade is grown on a raised bed of a Carnation house but if extra long heavy non-branching kinds are wanted, a night temperature of 40 to 50 will do it and wonderful flowers are grown in a house that you can not much more than keep the frost from. But it is necessary to use a well-exposed bed. Partial shade or a dark house will produce that drawn, soft growth — just what you don't want, especially in the non-branching type. And don't overlook rigid well-braced supports; two sets of wire and string is ample and one set will usually do for the late planting.

Spacing of the plants is another question for discussion. For both the branching and non-branching class the close planting method is generally preferred, especially if the flowers are for a wholesale market. This calls for spacing in rows across the bed about 8 inches apart and $2\frac{1}{2}$ or 3 inches in the row. We sometimes note them spaced about 4 x 5 inches but we prefer the row plan because it facilitates watering, also stirring the soil that should be done occasionally. A retail grower will use some short-stemmed flowers to advantage and to supply them some space should be given to the branching kind, spacing them about 6 x 8 inches and topping when about 8 inches tall. But most uses for Stocks call for them on 18 to 24-inch stems. The Bismarcks produce such flowers in better shape than will any of the other branching classes because their branching tendency is not so strong. But in close planting they will break more or less near the top of the stem and these breaks draw considerably from the central flower spike and even when disbudded, they do not approach for size of flower, individual flowers or stem length the non-branching type.

A crop of Stocks can be started any time in our latitude from August 1 to February 15. The danger of going blind because of high greenhouse temperature makes it unsafe for us to sow later than February 20. This sowing will flower around mid or early June, and tho Stocks suffer from high temperatures as all flowers do, their fine colors and stems find plenty of uses during the months of brides and graduates.

THE PROPORTION OF DOUBLES

While the percentage of doubles is an important question in the value of a strain of Stocks, we should remember that the singles are

by no means worthless. In a wholesale market, their value is from $\frac{1}{3}$ to $\frac{1}{2}$ that of doubles. But a retail grower uses them to much better advantage. In fact, a display of fine, long-stemmed doubles can use some singles with them to relieve their tendency to be stiff and bare. Double flowers are not a natural product, for all varieties tend to revert to the single form.

To maintain the high state of doubleness that many of our varieties enjoy calls for liberal cultural conditions. When these conditions are not favorable, they tend to revert to their original state. Calendula, Zinnias, and Asters are familiar examples of this. Also increased doubleness is at the cost of seed-bearing organs. This explains the added cost of a highly-bred strain of double flowers in any line. In the case of Stocks, the reproductive organs disappear completely in the double flowers, the singles only producing seed. This is why it is so difficult to increase or even maintain the percentage of unnatural doubles in Stocks. Most experienced gardeners have a pet theory on this question. One of these is that as the seed ages, the singles are the first to drop out because they are weaker. This seems borne out by the theory that the weakest seedlings are inclined to be the singles, but we have never proved this theory to our satisfaction. From strains that were up to 65 and 70% double we have repeatedly selected 100 of the weakest seedlings and found them down to 25 and 30% double; some of these were probably apparently weak because of delayed start or for other reasons. On the strength of this, we remove the clearly weakest seedlings from our beds when the plants are 4 to 5 inches high. To support the suggestion that weak seedlings tend to become the singles, we refer to the fact that the difference in weight and size of a dozen singles and doubles is considerable, making due allowance for the added weight of the double flowers. Another theory is that an irregular or wavy outline of the leaf indicates a single and still another, that a long tap root means the same.

Enthusiasts in studying this question have no doubt drawn much on their imagination. Selection among singles for maintaining or increasing the proportion of doubles in a strain is another and an important phase of Stock culture. In fact, we are led to believe this is a jealously guarded "secret." We regret that we are not in on this "trick," but we are happy to say that through single plant selection, without reference to any special characters, we have developed some pretty good strains of non-branching Stocks.

What Percentage of Doubles? Descriptions of varieties usually end with "and a high percentage of doubles"; sometimes this is so and sometimes it is not. The factor of chance in a small lot of seed might easily be responsible for this running either way and it might also be true that the available "magic" has been too thinly spread on the acreage grown for seed. One thing is certain — the seed grower rises

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or falls on his percentage of doubles. When this is down around 50 it is neither a credit or a profit to any one concerned. 60 to 65 is a good and to be expected average. A bed up to 70 or 75% doubles might, and frequently is, estimated at 90, for the heavier doubles overshadow the singles. A small lot of plants might, thru the factor of chance, actually count out 85 to 90% doubles, but this rarely happens. Consider the cost of seed production with but 15 to 20 plants out of a hundred as possible seed producers!

OUT DOOR STOCKS

Excessive or prolonged high temperatures will result in any of the 10 week or annual class of Stocks running into a blind growth — a cluster of thickly set foliage at the end of the growth and no flowers. It is for this reason that they are so frequently disappointing out doors in the Middle or Central States. From around central Wisconsin and north they generally make out all right and in California where the sun is intensely clear and day temperatures moderate with cool nights, Stocks flower wonderfully well. The class listed as "dwarf 10 week" are distinctly compact in growth and well adapted to out-door bedding. Where climate permits, if sown early in February, they can be grown into nice 4-inch pot plants for spring sales and when well flowered they are appealing. This early start assures their flowering thru late May and June. We suggest potting 4 seedlings in a 4-inch pot; if two are removed as singles, the remaining two will well fill the pot and one plant, well spaced, can be grown into a fine specimen.

Calendula

THE present strains of Calendula are so fine and their culture so comparatively simple that further progress in either direction seems slow. We find it difficult to add original cultural suggestions to what we have already made, consequently we reproduce the following which is from the last edition of the "Red Book." To this will be found added notes on varieties, especially some new ones that should be of interest.

Calendula seem to prosper in any old soil, even one full of eel worms, but they are certainly responsive to a balanced fertilizer, particularly nitrogen. This is, no doubt, accounted for by the luxuriant foliage they produce. But do not overdo with nitrogen during the dark months for this will soften the growth, and that is disastrous as we will explain later. The really profitable Calendula crop is the one that is in full for Christmas and January, — the depth of winter when flower production is at its lowest ebb and returns most attractive. To hit this period in the latitude of Chicago, we sow July 25 to August 1. Growers as far south as St. Louis had better delay a

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week or two, for *Calendula* are greatly weakened by prolonged hot weather. Summer seed sowing should be done in an out-door frame, and not too thick. An ounce should cover ten to twelve square feet. After sowing, we tack cheese cloth closely over the frame to bar the leaf hopper — the little fellow that infects asters with the "Yellows," and will do the same with *Calendula* with much the same results, a drawing and yellowing of the leaves, a fatality for which there is no help.

Watering the seed bed is done thru this cloth which should be kept intact until the seedlings are ready to transplant indoors. This should not be done until cool weather is in sight. In our latitude, this means about September 1. They will stand a week or even two of high indoor temperature, by which I mean 80 to 90°, especially if the glass is shaded. But if these enervating conditions are too prolonged, the plants will be forced into a crop of worthless flowers. And under some conditions, a form of rust will develop that smothers all the life out of them. So don't plant indoors too early. You might feel that a well ventilated and shaded greenhouse is nearly as cool as out-doors, but there is a softening close condition indoors that is entirely different from out-doors tho the temperature is the same.

Another point is to harden the seedlings in the frame some by holding the soil rather dry. In fact, if you keep it wet, the plants will run up ruinously soft during hot weather.

We spread about a 2-yard load of manure and 100 pounds of bone meal on a 200 x 5-foot bed before "Rototilling" it and this, in our soil, will provide all the feed a crop of *Calendula* needs. But don't forget that soils differ greatly. If it has been robbed by out-door crops or is of a sandy nature, the growing crop may be greatly helped along with a light top dressing of a balanced fertilizer once or twice during the season. A good *Calendula* plant needs lots to eat. Deep ground beds, well drained, will produce much finer flowers than a raised one. Still, you can grow good flowers on a raised bed, especially for size, but the stems will not lengthen. As on a ground bed, this can, of course, be helped along by liberal feeding and watering.

In planting, we space our plants 12 x 12 inches. This produces a mass of growth by early winter. Considerable care must be used in ventilating and watering to prevent rot setting into it. They must be kept clean of old leaves and traces of rot to prevent its spreading. The past season we tried the plan of spacing two rows across the bed six inches apart and leaving a space of 18 inches to the next 2 rows. By holding the growth in with string and wire, an open space is left for a better circulation of air. We open a furrow in this space and use it for watering instead of spreading the water all over the bed to encourage rot. Loss from rot is usually bad during the depth of winter when circulation of air is cut off and sunshine is weak. The growth at this time is well made and does not require so much water; besides,

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This photo was made ten years ago and it might be taken as an illustration of the fact that we have not made progress since, in increasing the size of our Ball Calendula. But perhaps, like some other flowers, they are large enough.

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evaporation from the soil is slow. These conditions, in a deep ground bed, makes frequent watering unnecessary. We usually run along without watering from the middle of November to the week before Christmas. Then we soak them well for the holiday crop. Not all soils or conditions favor the spread of rot as much as ours seem to. But it should be watched as a watering of *Calendula* with us during mid-winter is followed by much destructive rot tho we never water without full sunshine and wide open ventilators.

The question is frequently asked, "Should the first or crown bud that appears, be removed?" Whether it is done or not is of little consequence. Its removal, when quite small, will, of course, throw some added energy into the buds that follow, but if any use can be made of the short stemmed first flower, let it come.

Another and a more worth while question to answer is, "Why do the flowers sometimes wilt in a few hours after exposure to a living room?" Which could be answered by asking, "Why do roses and carnations sometimes do so?" It is true that because of their soft rank growth, *Calendula* frequently disappoint us when removed from the close moist air of cool storage to an average living room where they meet the other extreme of atmospheric conditions. Since it is perfectly clear that wilt is due to a soft growth, the question becomes one of how to harden it. We grow our *Calendula* in old houses from which it is sometimes difficult to keep out frost during severe weather. During the winter months, night temperatures range from 40° to 45°, and during the fall months, the ventilators are not closed until the out-door temperature drops well down in the 30's. And we keep them well watered until cold weather and steady firing really sets in after which they are carried along quite dry. This treatment starts our plants off hard and full of pep, thus when they are subjected to the artificial conditions of a greenhouse in mid-winter, they hold up. Their hard condition is further helped along by allowing the soil to become rather dry. This cold treatment, of course, brings the crop along slowly, but our September 1 planting hits the holidays pretty well and January heavily, and our flowers hold up, which is an all-important point. If you know anything of the nature of violets, you do not think of growing them in a carnation house. For the best results with *Calendula*, they should be treated nearly as cold.

Another question that we are sometimes hit with, and it frequently hurts too, is, "Why do my *Calendula* come single?" Less than 1% of them do this naturally. Such "throw backs" are weak plants, the first to flower, and should be pulled out. All our highly bred double flowers are unnatural products that, of course, have some tendency to show what their ancestors looked like. As long as growing conditions remain favorable, the production of double flowers is not interfered with, but when the plant's growth is checked or weakened, or its

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continued existence threatened in any way, it seems immediately to make provision for its perpetuation by becoming single to facilitate the production of seed. When a crop of *Calendula* is quite well cut down, the plant is weakened or checked, which explains the appearance of singles at this stage. When plants become weakened or starved as sometimes happens in poor soil or in a shallow raised bed, they tend to single out, especially if, to this, is added excessive temperature. When high spring temperatures set in, this tendency greatly increases until, by the heat of mid-summer, out-door *Calendula* are generally reduced to a single row of petals. And these same plants that produced perfectly single flowers under conditions that the *Calendula* does not enjoy will, with the coming of crisp fall days, produce the most perfect double ones.

As in all crops, the question of varieties or colors in *Calendula* is an important one. For either the market or the retail grower of an average section, we feel safe in suggesting that $\frac{2}{3}$ of a planting should be of the orange color — the balance mostly yellow with a few Apricot. But the demand varies considerably in different sections. As an instance of this, Max Schling of New York City tells me that his class of business calls largely for the lighter colors, while out in Iowa, we are told these colors are looked down on as "common." Down in Florida where *Calendula* flourish thru out the winter months and where the buyers seem in a holiday mood, all colors are wanted, but especially the lighter ones. This means that every section must consider its public and select colors accordingly.

After all is said, orange is clearly the important one in most sections and we believe our newest introduction, "Masterpiece," should be preferred because of its dark center. In the full open flowers this adds an attractive contrast and variation. It is fully as large and long-stemmed as the variety Long Orange which is a light-centered orange and a break from Gold, an extra long-stemmed deep golden yellow. A lighter shade of yellow with a richly contrasting dark center is Ball's Lemon Queen. So much for the leaders. Others that are found of distinct value by some are Supreme, a light shade of orange with a strong dark brown center. This is not so long-stemmed, but more freely produced, a choice variety if favorably conditioned. Apricot is a break from Supreme. It has the same habit of growth and dark brown center that contrasts effectively with the straw or apricot colored flowers. Our White is a further break from Apricot, also dark centered and of limited cut flower value, but choice for bedding where *Calendula* can be used for that purpose.

The variety, Sensation, was introduced a few years ago as having a crimson shade. We fail to note the crimson, but do find it identical with our Long Orange. Campfire is also in this class. The following should not be considered for cut flowers because of their compact



BALL Calendula Photo made 10 years ago and we continue to find it difficult to improve on their size.

short-stemmed growth that makes them valuable for bedding: Radio, a bright orange with quilled petal effect — distinctly attractive for bedding; Radio Golden Beam is a clear yellow variation from the original Radio; Orange King, the variety from which the original Ball Calendula was selected, is a dark centered orange and fine for bedding; Lemon Queen, a pale lemon color with a fairly heavy growth and stem. The following are distinctly dwarf and small: Nankeen, a cream-shaded Apricot and Pink; Trianon, a yellow, striped orange. The most recent addition to Calendula is the variety known as Sunshine. This is a clear yellow, of medium size and with a loose petaled effect. The stems lengthen out well, but its lack of petals or doubleness limits its cut flower value. The variety Chrysantha is, we find, practically identical with Sunshine.

Snapdragons

SOWING SEED

TO MAKE A flat statement that seeds should be sown at a certain date calls for some explanation when the climatic differences that feature this broad country are considered. This variation, say between Cincinnati and Chicago, is a marked one and makes a difference of several weeks in the sowing dates. Varieties, too, vary considerably in earliness. There is a tendency to introduce some varieties that might almost be classed as intermediate between the ideal earlies, such as Cheviot Maid, Ceylon Court Yellow or Sun-Tan, and the original class, and this new class calls for consideration in sowing dates.

TEMPERATURE

Snapdragons are decidedly cool-temperature plants and when a July sowing undergoes a temperature of 100 degrees or more, the seedlings weaken greatly and are easily killed by fungus, that exists in most soils, especially after the soil has been in the greenhouse and protected from the sterilizing effect of the elements a few years. Under such highly unfavorable temperature conditions, perfectly good seeds frequently rot in the soil, especially if the latter is maintained rather wet, and the writer believes this largely accounts for seeds frequently being termed no good. So, as a protection at all stages, use a mercuric or formaldehyde dust according to directions.

A few more words about seed sowing. Select a well ventilated cool house. An outdoor frame covered with a shaded sash might be better, but is not so conveniently cared for. Such locations are necessary for any summer seed sowing, for this work must be kept away from a hot greenhouse.

The writer is certain that frequent failures with snapdragon seeds, as well as other small seeds, are due to permitting the surface soil to become dry occasionally. This easily happens when one is busy, and if drying occurs as the germ is ready to break, its destruction almost certainly results, leaving bare spots in the seed bed. For this reason, the surface must be made level before sowing and be closely protected from air movements, receiving gradual exposure as the seedlings come on.

CAUSE OF FAILURE

Another certain cause of frequent failure in germinating such small seeds as those of snapdragons is covering them too deep. Use light screened material and spread on enough to hide the seeds — no more. If the soil was wet through before sowing and if the surface is properly protected, no further watering will be needed before the seedlings show. No contention is made that snapdragon seeds will live indefinitely, but the writer knows from experience that most failures reported

with them, especially during the summer months, are avoidable.

As promptly as the seedlings are large enough to handle, we prefer to plant them into flats. This checks damping off, that so commonly destroys them. After the seedlings are well on their feet, the soil should be permitted to dry out fairly well between waterings. This prevents damping off by hardening the plants. There is nothing more easily started than snapdragons if conditions are right, but the hot summer months are much against them, especially in the seedling stage, and this explains numerous failures.

After our transplanted seedlings get up an inch or two, we place them in 2½-inch pots in an out-door frame, shading them a few days, of course. After a month or six weeks in pots at this season, they will develop buds, and around August 1, they should be planted.

DATES TO SOW SEEDS

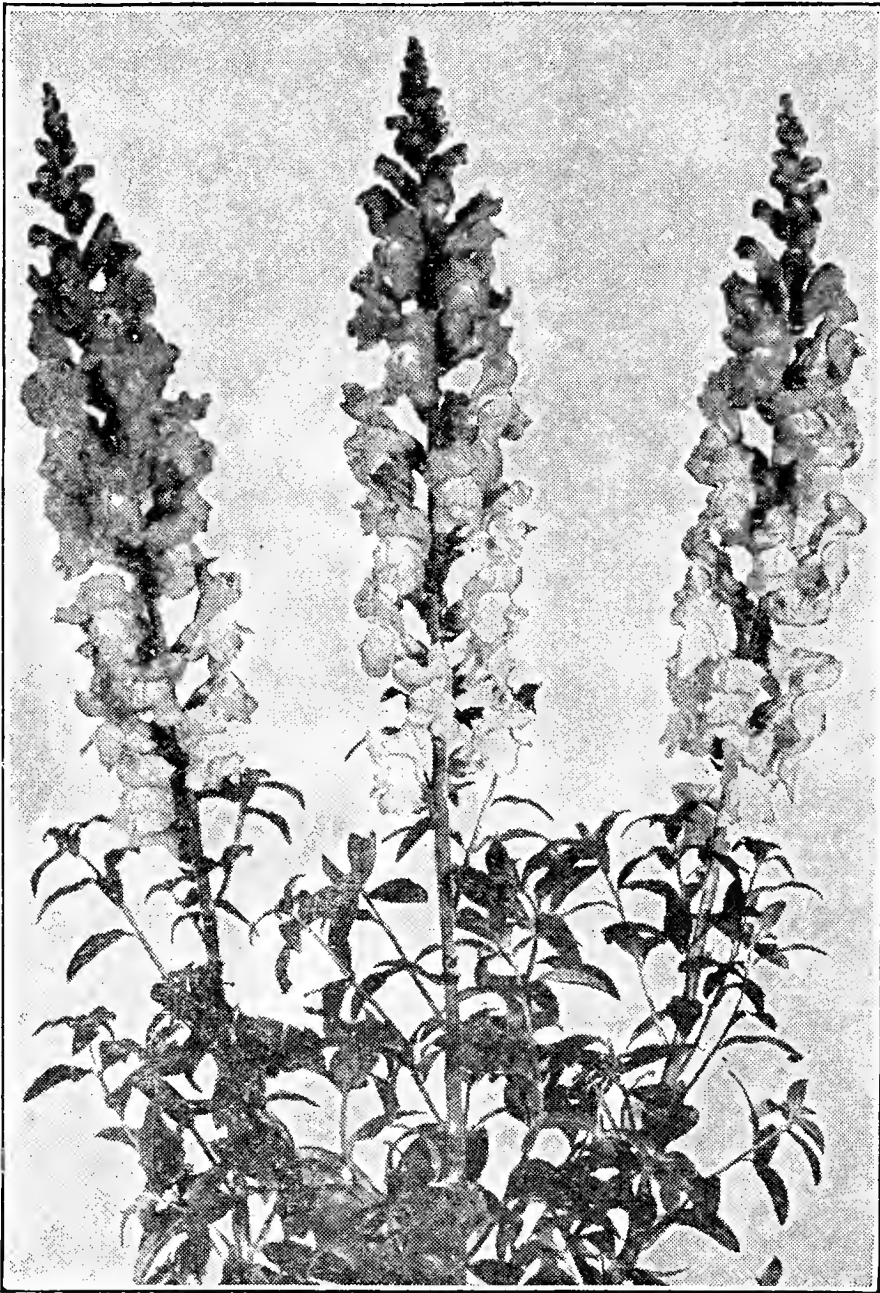
For beds that are ready to plant in September, in our latitude, snapdragon seeds should be sown early in July. Growth is rapid at this time and if the planting cannot be done until late September, 3-inch pots will be necessary to hold plants in good shape. To follow October mums, sow seeds around mid-August. Beginning about mid-September in the latitude of Chicago, the growth of young stock is not so rapid. It usually requires about three months at this season to produce good 2½-inch plants from seed. Better stock can be produced with more economy by carrying it along in an out-door frame, especially at this season. If gradually hardened, young stock will stand a real freeze. In fact, if gradually hardened, the half-hardy perennial nature of the plants is invigorated.

Early in January we make our final sowing. The seeds are sown rather thinly and not transplanted, as is necessary when hot, to check damping off. Late in February this sowing is planted out in rows eight inches apart across the bed, with the plants 3 inches apart in the rows. The crop comes in the early part of June, on 18 to 24-inch stems, when the big spring snapdragon crops are out of the way.

TOPPING

Originators of new varieties frequently suggest specific topping methods. With few exceptions the plants are headed back to advantage at this season by cutting the stems down to four or six good eyes—that is our rule with all of them. Whether you top before or after planting makes no practical difference, but we like to see them all in bud or flower before doing so and then head them back uniformly.

Another point of practical importance is to avoid permitting the young stock to become badly pot-bound and hardened in the small pots; the plants might easily develop rust in this condition. During



EARLY OR WINTER SNAPDRAGON AFTERGLOW

This belongs to the Witterstaetter strain that includes Rose Queen and New Cincinnati. These three varieties represent one of the finest strains of American "snaps". Not quite so early as some but the added vigor that this habit implies produces the long handsome spikes that characterizes the strain.

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midsummer they set buds at a height of 8 to 10 inches and the sooner they are planted after that the better for them. You may have to get them out before August 1. Have the benches ready.

Snapdragons will stand a well enriched soil, and for winter flowering a raised bed is preferable, as it is for most winter-flowering crops. The writer is even inclined to believe that winter sweet peas in sections where much cloudy weather prevails will repay the added cost of these beds. However, some leading specialists use ground beds for mid-winter snapdragons. Thorough drainage and careful handling of water will partly overcome the disadvantages of such beds.

SPACING

Spacing is something of a debated question in growing snapdragons; 7 x 8 inches is frequently used, but we feel that this overcrowds even the early-flowering varieties. 4 to 5 growths are usually carried, and part of them are certain to be crowded out and become weak or undeveloped in such limited space. We have tried this close spacing with the early crop, limiting the growths to 2, but with no better results than from more liberal space with 3 or 4 growths.

We prefer spacing not less than 8 x 10 inches and under present market conditions, we might do better by spacing 10 x 10 inches and by limiting the first crop to 4 good growths; this would assure somewhat better developed flower spikes and, please remember, only well developed stock will sell at anywhere near a profit today. On the other hand, for planting after late chrysanthemums and up to March 1, we have done well with rows 8 inches apart and plants 3 inches apart in the row, as for non-branching stocks.

Not much attempt is made to disbud the snapdragons, as most varieties, especially the early ones, naturally carry up a single stem and flower when spaced close. Except for exhibition flowers, we find small returns for the time spent disbudding snapdragons. The action does not affect the flowers or stem in any way the writer ever noted and, if plants are properly spaced, there should be little side growth development.

COMBATING RUST

Among the several diseases commonly met with, rust is the most serious and, according to our experience and experiments, little relief can be had using the various materials suggested for that purpose. Through the proper cultural conditions, maintaining vigorous growth, rust is resisted. This means providing a dry buoyant atmosphere through ventilation whenever possible and, also, allowing the soil to

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reach the dry side before watering, which permits the formation of white, or feeding roots and keeps the growth hard — an important point.

The growth must also be well nourished, just as any form of life must be to ward off disease. If we start out with a rather lean soil and add well rotted manure in the proportion of one part of manure to four parts of soil, or even one to three, depending on the manure, the plants should stand a light top-dressing of a 4-8-4 fertilizer by October. What is given after that depends upon the growth; if it is rather light in color and texture, it should stand another application a month later.

HEALTHY RESISTANCE

An example of developing resistance was met with in a lot of outdoor snapdragons the past season. Part of them were irrigated heavily during mid-summer and they responded with a free clean growth, while those not watered became stunted and hard, developing rust badly. Rust can only be resisted by vigorous growth. With high spring temperatures, the growth becomes soft and nothing can keep rust from overwhelming the snapdragons.

USE OF SULPHUR

The use of powdered sulphur, when combined with an increased temperature, 60 degrees or more at night, has been reported as definitely destroying the spores of rust. Also, maintaining a dry atmosphere is of prime importance. Do all watering early and on bright days when the ventilators can be used. The suggestion that not a drop of water should touch the foliage calls for some explanation. It is necessary, during hot weather, to syringe for red spiders, but this should be discontinued with the coming of cool nights. Water on the foliage of snapdragons is as refreshing and beneficial as it is on any growing crop. On warm days it checks too rapid evaporation that causes the plants to wilt, but if rust is present, wetting the foliage spreads it effectively, and it is under this condition and that of dark cool weather that wetting the foliage should be avoided.

EARLY-FLOWERING TYPES

Of more immediate interest is the splendid line of early-flowering greenhouse varieties that the cut flower growers are responsible for. In these brief comments on varieties it should be clearly understood that growing conditions and methods of management vary with most of us, which explains why some discard a variety that perhaps a

neighbor is successful with. Among recent introductions there is a clear tendency to get away from the typical early-flowering types. Some of the forms are almost intermediate. Because of their greater vigor we feel these varieties are valuable if planted earlier and grown on raised beds. They should, of course, have greater value in southern latitudes, where open fall weather is more prolonged, than farther north; such weather conditions tend to harden or check the growth into setting buds.

It is generally agreed that the Cheviot Maid type of snapdragon is the typical early-flowering one, particularly the rose-pink Cheviot Maid Supreme and though we find the original strain somewhat earlier, we prefer the latter for color and stem. Sun-Tan, a dark golden orange of clear Cheviot Maid habit, should be preferred if early flowering is a factor. For an early yellow, Ceylon Court Yellow continues to hold on, though it can and will be improved for depth of color.

DISTINCT TYPES

In the golden orange Afterglow and in Rose Queen is a distinct type of growth. Early, but not so early as Cheviot Maid, they mingle the habit of strong growth with earliness in a way that gives them outstanding value. Rose Queen is a deep rich shade and should not be confused with the late-flowering majus grandiflorum of the same name. Complaints are occasionally received of the snapping of flower heads of Afterglow. This is an example of varying conditions of soil and fertility, for most growers have never seen this happen. The writer suggests that this brittleness might be due to an excess of soil nitrogen. For early flowering, these varieties should be started 2 to 3 weeks earlier than the Cheviot Maid types.

New Cincinnati belongs in the foregoing class, is several shades lighter than Rose Queen and, we find, is an exceedingly attractive commercial color. Roman Gold continues to be sought. Though the flowers are spaced rather far apart on the stem, the bunched effect of its bronze yellow blooms that are slightly suffused with pink is attractive.

WHITE CLASS SMALL

Only a few white snapdragons are wanted, and no really good variety is available, though a number of candidates are showing up. Claudespy disappointed the writer in being an intermediate, though with the originator, it is reported especially fine, providing another example of the effects of conditions and treatment.

Last January the writer saw a fine bench of Lucky Strike. The stock was an example of what early planting, a raised bed and a

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52-degree house will do for what might be called an intermediate variety. But perhaps under the raiser's climate these special conditions are uncalled for.

Among our past season's trials, Coate's Yellow Perfection was outstanding for a rich depth of color — golden yellow — but in our deep ground beds and with September 1 planting it was late — a month later than Ceylon Court Yellow under the same conditions. The writer is convinced that Coate's Yellow will well repay the conditions this type of growth calls for. The same can be said for Terry's Surprise; this makes massive flower spikes of pink and bronze. We find it a high-class commercial variety.

Under our conditions, Winter King, Winter Helen, Sunshine and Jennie Schneider are in the same strong-growing class that calls for early planting, raised beds and a night temperature of not less than 50 to 52 degrees.

In Europe the past season the writer saw a strain of semi-double snapdragons that came about 60% true and showed a range of colors. Neither for size nor doubleness do they compare with several such American varieties that are courting favor and that, the writer believes, are patented. These are attractively and fully doubled, reminiscent of Majestic Twilight, though the color is darker and the size even greater! Their cut flower value is outstanding, but the writer understands propagation is possible only from cuttings.

FANCY COLORS

As with spring sweet peas, a few of the standard type add that all-important variety and interest so necessary to make any product attractive. This list can safely be headed with Majestic Twilight, a desirable golden apricot of unusual size and rather compact growth. To make good stems it should be planted not later than January.

Among the maximum type, Appleblossom, a light pink and white combination, is good and in this class most strains of Snowflake and Golden Queen will be found quite true to color, as is Cattleya, a rich lilac lavender effect. However, the two finest colors the writer has found for spring flowering are in the early golden orange Afterglow and the rich deep rose, Rose Queen; also New Cincinnati, a rich, light rose pink.

Annual Larkspur

IN THE cool seed-growing sections of California where the sunshine is undiluted and intense and the soil very deep, Larkspur reaches its finest development. Greenhouse-grown stock will not nearly equal it in heavy spikes or color, yet it is a welcomed spring cut flower item that no retail grower, especially, should miss. Under ordinary winter conditions, it does not develop or color well and for this reason should not be started early: and there is another reason — the seed germinates poorly or not at all in a high temperature. If you must sow in summer, do so in flats under a bench or in a cool shed or better still in a shaded out-door frame. Unless stored in air-tight containers and at a low temperature, Larkspur seed, like its close relative, the perennial Delphinium, will not last longer than a season; why six month old seed will sometimes grow and sometimes not is hard to explain. The new seed crop is ready in September and should, of course, be waited for.

We do not prefer to plant Larkspur after early Mums if the houses are to be run cold, especially if ground beds are used. A cold house that cannot be freely ventilated in mid-winter becomes overcharged with moisture that easily causes decay to set into the soft growth. On the other hand, in a shallow raised bed, the growth becomes harder, especially in a Carnation house temperature, and under these conditions, rot does not so easily set in.

We have flowered some pretty good specimens of the Hyacinth or non-branching type early in February on raised beds from a planting that followed early Mums. From the same lot of plants planted in a deep ground bed and a cooler house, we got a heavy hollow-stemmed growth, much of which was lost thru the tip of the growth rotting away.

When long or heavy-stemmed, the Hyacinth class is objected to by buyers because the hollow stems are so easily broken in handling; but it is choice in a shorter and more hardened form such as will result from planting on a raised bed and in a Carnation house temperature.

If Larkspur is wanted in mid-winter, the branching kind also does very well under such restricted conditions tho it will be several weeks later getting into crop than the single stemmed kind. Another important advantage a raised bed has is in the freer circulation of air and the better drying out of the soil. This is important in preventing the tendency to rot that this crop is susceptible to in a damp cold house.

If you look over a field of out-door Larkspur late in September after the fall rains have moistened the soil, plenty of self-sown seedlings will usually be found. If potted into 3's and carried along in a cold frame, they will make fine stock to follow Mums but, of course, will

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be more or less mixed. Since they are half-hardy annuals, a light freeze will not hurt, in fact it seems to invigorate them. If planted in a deep ground bed of a well ventilated house, watered sparingly and carefully, this planting should make fine long-stemmed flowers by early spring. But if a bed of clean straight colors is wanted, better buy seed of the improved varieties. This early planting will not flower much before March, but it has the advantage of strong heavy growth that produces long-stemmed flowers. It should be spaced at least 12 x 14 inches and provided with several tiers of wire and string supports.

We prefer to sow our main crop about November 1. If potted in 2½'s this sowing will make nice stock to plant out about January 1, and if 3-inch pots are used and a cold house, they can be carried along to February 1 or Valentine's Day. These later plantings will not produce the heavy growth the earlier one will, but they will flower nearly as early. Our final sowing for indoor flowering is made about February 1 and under cold house conditions this comes in for Mother's Day and after. A sowing around March 1 will come in nicely for June business, tho like all cool house crops, it doesn't hold up well when hit by a hot spell.

AS AN OUT-DOOR CROP

The branching type is an easily managed and largely used out-door crop. Like other field crops it responds to a deep rich soil and free cultivation. The earliest lot is to be had from unheated sash houses or cold frames. A March 1 sowing can be transplanted to such quarters but don't attempt to push it thru lack of ventilation. This should flower by the end of June. The second out-door crop comes from a fall sowing out-doors; this is not always successful in our latitude because of extreme weather changes and lack of dependable snow protection, but in the latitude of New York or St. Louis, a fall sowing of well-established seedlings is usually wintered over. A spring sowing out-doors should be made as early as the soil can be handled. We do not find it worth while making a second one later than May 1.

DISTINCT TYPES

There are two main classes of Larkspur, the branching and the non-branching or Hyacinth flowered. The branching type is used almost exclusively and has been greatly improved in recent years by what is known as the Imperial or base-branching habit. While this class is not 100% true base-branching, it is a distinct improvement as far as it goes in that the stems are longer and the flower spikes heavier and more uniformly double flowered. The stock-flowered type branches from the main stem and for that reason cannot

be so long stemmed. The Hyacinth flowered class is strictly non-branching. In a deep ground bed it produces a heavy long-stemmed growth, but with this growth goes a hollow stem that rather easily breaks in handling. If grown on a raised bed and pushed into flower in a carnation house temperature at a height of around 18 inches this type makes choice cut flowers. We have also done well with it planted in frames in early spring. But don't plant in a cold house and grow it along slow. Another branching class known as the Emperor grows up about 18 inches and is useful for bedding only.

VARIETIES

The various shades of pink are deservedly the most popular in both cut flower classes. In the branching class La France and Los Angeles are true pink shaded salmon. Though generally listed as Stock-flowered, we find they tend to the base-branching habit. Exquisite Pink Improved we find clearly inferior in size and doubleness to the above two. Miss California is a shade darker, more attractive and one of the very best, we should say. The new variety, Rosamond, is yet deeper and very choice: this will not be available until 1934. Carmine King steps up the color to almost clear carmine, but is not quite so tall as the others. Rosy Scarlet comes next in color, but is Stock-flowered with some singles. We feel sure the Stock-flowered Lilac is not as much appreciated as it should be. It might be called lilac-lavender and is very choice though strictly Stock-flowered with some single tendency. The Stock-flowered dark blue is a rich deep



The New Base-branching or Spiral Type of Larkspur.

color that can be used as a purple. White Spire is the only one in this color to consider. The new Blue Bell is more uniform in color and some deeper than Sky Blue.

Zinnias

THE following extracts are taken from a circular we publish (sent gratis) giving full cultural details on Zinnias. In getting started with Zinnias, loss and disappointment will be spared if we remember that their nature demands a rather high temperature, and this, of course, extends to seed germination — a source of frequent disappointment.

The seeds of most plants, even those whose nature calls for cool house treatment, seem to germinate more surely, certainly more promptly, in a comfortably warm temperature.

There are several ways that money can be made out of Zinnias. The first one we shall consider is the growing of young plants for the home gardener. Good results can be had by sowing the seed right in the garden after the weather becomes warm and settled, but there is a demand for young, well established plants. This earlier start is all right, too, if the plants are not stunted in pots by starting too early, which often happens, or are drawn up by overcrowding in flats. They should not be planted outdoors earlier than tomatoes, and don't forget that a good small pot plant is produced in 4 or 5 weeks of active spring weather under glass. A common error is starting too early, resulting in hardened or checked growth that terminates with a small single flower. So don't start too early. And before selling the plants, harden them some, just as you would tomatoes, for a light frost will weaken their reputation and possibly yours as well.

For the trade that wants to pay as little for these plants as possible, a good plan is to transplant the seedlings about three inches apart into flats or in an open bed. This plan might make better stock than pot-grown, because of the lessened danger of hardening. In either case your investment in these plants is turned over in six weeks, which should make them worth attention.

FOR CUT FLOWERS

The second and broader field for money in Zinnias lies in their value for cutting. They are not at all suited for profitable winter forcing, though artificial light will, no doubt, force them into mid-winter flowers, as it will asters. But spring weather conditions are enough to their liking under glass to get them into full crop during late April and May, and when these weather conditions are combined with the well-enriched soil that we find in most greenhouse beds, perfect Zinnias are produced and on fine stems.

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To make this planting, sow about March 1; transplant the seedlings into flats a few weeks later, and they will be ready to plant out about 4 x 4 inches almost any time in April when a bed in a fairly warm house becomes available. During June, greenhouse beds frequently are wastefully waiting for something. Further, if you should want them again about September 1 for fall crops, what can be done with them during July and August? Frequently they are left empty when they might be producing long-stemmed, clean Zinnias. If Queen of the Market or Royal Asters can be planted about May 20, not later than June 1, they will no doubt pay out better if yellows, stem-rot and red spider are controlled, and it is quite possible to do so.

Zinnias offer an easily and quickly developed mid-summer greenhouse crop. The pompons, or Lilliputs, and the pumilas, as well as the new picotee class, develop perfectly under such conditions and with good stems. Their size is not at all affected by greenhouse temperatures, and with good stems, they provide choice colorful material for summer work. If large or Giant type seedlings are planted out on a greenhouse bench about 4 x 4 inches, they will run up beautiful long-stemmed large flowers in a surprisingly short time during June and July. With this crop, greenhouse space can be utilized that frequently is wasted. We should add that wire and string supports are necessary for they will draw up two to three feet and when spaced closely as suggested, they produce few or no laterals making the crop a quickly cleared one.

FOR OUTDOORS

We find Zinnias particularly well adapted to growing in cloth houses. We make two sowings, the earliest and the main one about June 1. This gets in late July and the long-stemmed clean flowers are welcomed at that time. For latitudes further south this first sowing might be made May 15. Our second cloth house sowing is made about July 1, and is in full crop with the asters. Because of their strong rich clean colors and long stems we find our cloth house Zinnias well received. Such stems are produced by sowing the seed in rows across the bed 8 inches apart, drilling the seed in the rows close enough to have the seedlings at least an inch apart. This runs them up close enough to crowd out laterals, though a few will appear and can be removed. Two sets of wire and string supports should be provided for cloth house Zinnias grown in this way, though one set will do if it can be raised as the growth lengthens. If the close spacing plan is used for the outdoor sowing, the same long stemmed results will be had though they, of course, do not draw up in the open to the extent they do under cloth where the stems sometimes become unnecessarily long. We have used the same close sowing plan with Giant African Marigold

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when grown out-doors with equal success in lengthening the stems and next season we shall try them under cloth.

The past summer the writer was attracted to a thriving roadside flower market. It should be said in passing, that such outlets on big highways offer real business opportunities. And here is where Zinnias shine. The stand referred to was selling them as fast as they could be cut at 25 cents per bunch of six to eight big flowers. It was interesting to note that the Lilliputs sold well as second choice, while the pumilas, without the appeal of either extreme, were unnoticed. And it was significant, too, that roses at this stand at 25 cents per dozen, were passed up in favor of the showy Zinnias!

DAHLIA-FLOWERED TYPE

By common consent, the dahlia-flowered type heads the list. The center petals of this class tend to incurve, which adds an effect of depth and fullness to the flowers. This is the original giant Zinnia, and the varieties that make up this class are generally well established and come quite true. We find the following standard varieties particularly choice, and we list them according to their cut flower value: Exquisite, a clear rose-pink; Oriole, a flaming orange and gold combination; Illumination, deep rose-pink; Golden Dawn, extra-large golden yellow; Old Rose, well named; Dream, bright deep lavender; Crimson Monarch, and Polar Bear. Though it is frequently called for, we find limited cut flower value in the last named.

GIANTS

The Giant Mammoth type, sometimes known as California Giants, give the Dahlia-flowered a close race for first place. Fully equal to them in size and general effectiveness, they are distinguished by the petals lying flat, not incurved in the center as are the Dahlia-flowered. While the depth effect is not so pronounced, the size is all there, and so is the full complement of colors. We find the following varieties especially noteworthy: Rose Queen, Orange King, Brightness, Golden Queen, Lavender Gem, Grenadier and Scarlet Gem.

PUMILAS

We next come to the pumilas, about one-fourth the size of the large classes and for this reason of distinct value for cut flower work where the larger flowers cannot be used. They are not so long-stemmed, but long enough for most work; in fact, they are effective cut flowers when well grown. The choicest color is Salmon Rose, though Canary Yellow, Golden Yellow and Fireball are attractive.

LILLIPUTS

The Lilliput group is next in order. They are less than half the size of the Pumilas, neatly formed pompon type flowers and of outstanding value for summer decorative work. This is especially true if grown indoors, where stems draw up better. Combinations of these small Zinnias and suitably colored statice will produce striking decorative effects. The same line of colors has been worked into this group that is found in the Pumilas. And again Salmon Rose is especially choice.

To complete the range of sizes, we must add the small-flowered bedding variety, Haageana, generally listed as Mexican Hybrids. They are too small and dwarf for cut flower value, but for border and rock garden work, they deserve wider use.

RECENT GROUPS

No account of modern Zinnias would be complete without reference to several distinctive groupings that have been added recently. It is true they require some "fixing," but no list should be without at least the Picotee Delight class. This curled and fluffed type of flowers is distinguished by delightfully fine picotee markings. About the size of a Pumila, they are available in Salmon Rose and assorted colors.

And yet another new line with possibilities for the cut flower grower was released the past season as New Wonder. This is a trifle larger than the Pumilas and is available in a bright cerise pink and a rose-pink. The distinguishing characteristic is earliness. This class will easily flower under favorable greenhouse conditions in six weeks. An experienced plantsman knows that an early-flowering habit can be had only at the cost of vigor. But for a promptly cleared greenhouse crop, this adventurer in the Zinnia family will find a place for itself.

Petunias

PETUNIAS are the most valuable crop the retail grower has. Our reason for this rather broad statement rests on the ease and low cost of producing them, as well as the all summer's satisfaction they afford. For this reason some consideration of their cultural preferences and varieties is time well invested. They enjoy a moderate temperature such as a Carnation house and almost any type of fairly light soil. Good drainage at all stages of their growth is necessary. When this is faulty it is quickly manifest by yellowing of the foliage. This doesn't mean that drainage material need be used in even a 4-inch pot plant but if heavy soil is used, some humus such as peat moss, as well as some sand, should be added to insure water passing through it readily.

All very small seed gives much germination trouble. When this happens with Petunia seed we believe excessive covering causes much of it to lie dormant or rot if at all weak and the soil maintained in a wet condition. Fine seed really needs no appreciable covering — merely pressing it gently into the soil and applying some water in a fine spray will surround the seed with sufficient soil protection to germinate it.

The very important point is to maintain the surface soil uniformly moist — permitting it to dry as the seed is swelling or germinating can easily destroy good Petunia seed. Maintaining uniform moisture is easily done by sheltering the flats or pans in a boarded-in enclosure covered with a sash. This should be on a raised bed with some bottom heat, which is another important help in germinating Petunia seed. A Carnation house temperature without the stimulating effect of bottom heat will usually germinate a good stand of Petunia seed but should the germ of some varieties be not so strong as others, failure might result, where a stand might have been had with the encouragement of gentle bottom heat. The lack of this form of heat can explain why a lot of seed that makes a good showing in a seedsmans' heated seed tester, will be "no good" when sown in an ordinarily cool house. In sowing a lot of seed of different kinds, it is hardly reasonable to expect the germination of each to be equally strong or high, but if favorable conditions are supplied especially for Petunias, much loss will be avoided.

After the seedlings are large enough to easily handle, they should be transplanted to flats about 2 inches apart. They are more easily managed and grow along freer than when confined to small pots and this applies to much other stock as well. After they get a good start or begin crowding, the large flowering kinds, that are to be grown in pots, should go into 3's. To make fine plants out of the doubles or



Hybrida
Bedding

Grandiflora
Plain

Ball Fringed
Mixture

Giants of
California

Double
Fringed

More well grown petunias in 3 to 4 inch pots could be sold than are usually available. They are not only more attractive and in greater demand than most plants grown from cuttings, but they are more economically grown, a vital factor these days.

the Giants a further shift to 4's is necessary, but good plants with a large flower can be produced in a 3-inch pot and under present economic conditions this size will be most profitable.

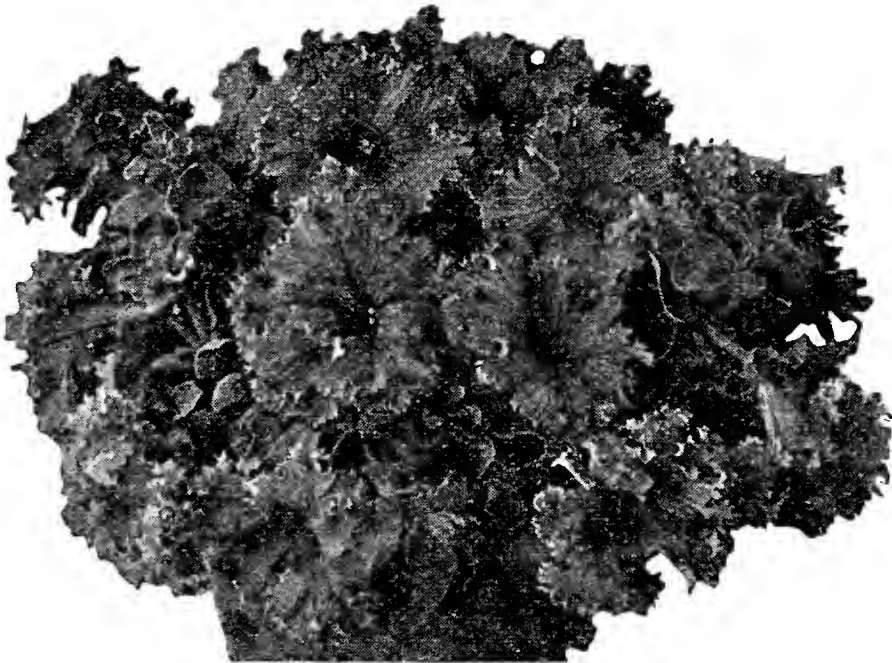
PETUNIAS IN FLATS

The remark is occasionally heard that the Petunia business is being cheapened or worse, by the system of growing the small flowering kind in flats of 60 to 75 and retailing them for a dollar. Such plants if not over-drawn or crowded, are really to be preferred for bedding to a small pot-bound plant. Furthermore, they are usually more profitable than small pot plants and the system encourages the buying of greater numbers. "A whole flat — 6 dozen for a dollar! We'll take the flat" is a familiar transaction in which the florist frequently gets a dollar instead of probably 50 cents if bought from pots. It has a popularizing affect on the small flowering Petunia business too that in no way should affect the selling of the Giant Superbissimas in 3 or 3½-inch pots. Furthermore, there is no reason why the attractive grandifloras should not be used for growing in flats, especially the dwarf ones; but this business is largely confined to the dwarf Hybridas such as Rose of Heaven and Rosy Morn. The new German variety, Celestial Rose, is deeper in color and more compact in growth than Rose of Heaven and is one of the very choicest for growing in flats. We should also mention Norma in this connection; this is a small mid-violet blue that comes uniformly starred and of exceptionally compact growth.

AS POT PLANTS

Many more Giant Petunias in 3-inch pots could be sold than are usually available; when nicely grown and with a good flower they are as good as sold in any live retail business. At least two sowings should be made — the first one around mid-January and another a month later. This will provide a succession of flowers through May. If your trade will pay the trifling added cost, a 3½-inch pot will, of course, produce a better flower than will a 3-inch and if shifted into 4's they can be carried into June in fine shape. A raised bed close to the glass is the place for this stock. Don't set them on a ground bed, for they will root into the soil and wilt when moved. The dwarf California Giants are the class to use for large showy flowers. Good strains will produce 80 to 90% true Giants, and they are highly effective for bedding if favored with some extra attention as to soil preparation and an occasional good watering.

Probably the choicest of all Petunias for pot plants are the doubles. For good 4-inch plants in May, the seed should be sown early in



This cut represents a comparatively new class of *Grandiflora* petunias of which *Setting Sun* is an example. The compact habit makes them ideal for any purpose.

December, for their growth is not so vigorous as is that of the singles. In planting or potting the seedlings, take good care of the small or weak ones for they are most inclined to produce double flowers. If the soil for Petunias is not fairly well enriched, the foliage will sometimes turn yellow though the drainage is perfect. We have turned the foliage of such plants green and stimulated the growth through a light top dressing of 6-8-6 fertilizer. But before applying it be sure the plants are not yellow from overwatering or overpotting. We prefer to transplant the seedlings to flats and when they begin to crowd pot into 2½'s; then when well-rooted, to 3 or 3½-inch.

If they are permitted to become hardened in pots they will never produce really fine flowers which, of course, applies to any plant that has its growth checked in this way.

Fine stocks of Petunias, especially the double ones, are worked up through propagating by cuttings that root easily, for their growth is of a perennial nature. For this purpose the choicest specimens should be planted out on a raised bed of a Carnation house. In a deep ground bed they tend to produce a wild soft growth that sometimes reverts to single flowers.

Real improvement has been made the past few years in breeding up double Petunias. They are now available in strains that will produce close to 100% double and semi-doubles and with such stock it hardly pays to propagate by cuttings for seedlings are more vigorous.

CLASSES AND VARIETIES

Beginning with the smallest flowering, the following are the leading classes of Petunias, with our comments on the leading varieties in each:

Hybridas. This is a small flowering class though nearly averaging in size with the dwarf Hybridas that follow. But in habit they are distinctly taller, averaging about 12 inches in height. Carmen Sylva, violet with white throat is more compact than the class, also some smaller and freer flowering — rather choice for bedding. Inimitable is of much the same habit and size; unlike many striped and blotched effects, a good strain of this comes quite constant in its striped and blotched effect. Inimitable is also available in the Hybridas compacta class. Howard's Star Imp. is a popular one, reddish purple with a white star but under our climatic conditions, the stars come and go. But at that the general effect is an attractive one. Blue Bee comes practically 100% mid-blue; a true Hybridas in habit and a very good blue.

Hybridas Compacta or "Nana Erecta." This is a small-flowered or Hybridas class that has been bred to a desirable compact habit. Under this heading will be found the most popular bedding varieties, as well as the most preferred ones for growing in flats. According to our experience the new variety, "Celestial Rose," that the writer brought from Germany the past season is the out-standing one in this class! It is well described as an improved Rose of Heaven, being a darker and more attractive deep rose; also distinctly more compact in growth and truer to color type. Rose of Heaven makes a heavier growth — there is clearly room for both. Rosy Morn with its large white throat is probably next in value. A good strain of Violacea in this class makes a fine deep violet blue and Snowball is a perfect white, quite true to color. Heavenly Blue, if it came true to color, would belong high in this class. The color is a silvery blue, its original name, but ordinarily it will produce around 25% rogue colors. It will, of course, become better fixed eventually. For a small flowered dwarf mid-blue with a white star that is dependable, the variety, Norma, is a choice one. We find Cockatoo, the new reddish violet, marked white, very undependable in its white markings.

Balcony or Pendula Type. A very desirable and popular class. The growth of the true type somewhat tends to spread, or trail over when used in boxes or baskets. The flowers are distinctly larger than the Hybridas and the colors or varieties come quite true except Star of California, a crimson shaded blue with a white star that is undependable under our climatic conditions. Balcony Rose is large and fine, so is Crimson, also Blue that is sometimes listed as Violacea.

Grandifloras — Plain or Waved Edge. Under the Grandifloras will not be found the Giants of today. We should now class them as medium large; they are quite free flowering and fine for bedding.

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Such kinds as Elk's Pride, rich velvety purple, and Pink Glory come under this head. Some of them, such as White Cloud and Dwarf Pink Glory are distinctly dwarf. The latter is one of the most richly colored sparkling deep rose we have; but less than half will come Grandifloras — the balance will be of the same rich rose but smaller. Kermesina is described as a Tyrian rose, a rich bright shade. About 50% of our stock the past season ran true to type, an extra large dwarf, plain-edge. The off ones were of similar color but smaller and not at all dwarf. This variety has possibilities because of its size and should not be confused with a fringed variety of the same name. Queen of the Market is rather small for a Grandiflora but belongs under this heading. The color is a deep carmine rose and highly effective.

Grandiflora Single Fringed. Some choice standard kinds are found under this heading. Some dwarf, others not. All are of good size and valued for pot plants or bedding. Among them are Theodosia, well known and popular for its finely fringed pink flowers with a golden yellow throat; but it is not dwarf which must be admitted also for Pink Triumph, also finely fringed. And Royal Purple gets rather "lanky" if not headed back some, but it is well named, comes quite true to color and is popular. Among the distinctly dwarf in this class should be mentioned Pepita, a deeply fringed scarlet and white combination. Setting Sun is a brilliant rose of extra dwarf habit and Brilliant Rose is a rich deep Pink Glory color but needs further selection to increase the proportion of the true type. A mixture that also belongs under this heading and known as "Ball Single Fringed Mixed," will be found of medium size, compact and well fringed.

Ruffled Giants. None in this class are fringed but all are well-ruffled, of immense size or a large proportion should be, and rich in coloring. They are showy and well suited to bedding though lacking the free, easy growth of the Hybridas and for this reason need more encouragement. This means well prepared and enriched soil before planting, frequent watering during dry weather, and cultivation of the surface soil. They enjoy the full sun as do all Petunias, but they will make a nice showing in partial shade. They are choice pot plant varieties and for this purpose are profitable because of the short time they occupy the larger pots and the readiness with which they sell when in flower.

Among the very choice ones in straight colors, the following are especially noteworthy: German Empress, bluish white with dark veining and throat; Prince of Wuerttemberg, dark crimson with black throat. We consider the above two the most striking in their class as both come quite true though the former produces some medium size flowers, and both are of dwarf habit. The latter should not be confused with Princess of Wuerttemberg, a rather light shade that

your customers will not pick out as they will the darker ones. But this color preference will vary in different sections. Dark Copper Red is a rich and well-named color. Where the lighter shades are appreciated, — and they are choice, Princess of Wuerttemberg and Silvery Rose are excellent.

The demand for the Giants centers largely on the various mixtures, particularly the California Giants or "Superbissimas," a term applied to all the Giants and denotes their open throat character. This strain is available in both dwarf and the regular Giants. Ruffled Monster is another half dwarf Giant strain. The Ramona Strain is still another and a dwarf one. There is usually no practical difference between any of these. Their value depends entirely on the care used in roguing the seed stock and the extent to which the grower is willing to sacrifice plants that do not measure up to a high standard. The past season's best strains were 90% perfect. From this high standard we get down to some as low as 40% good. And curiously enough the larger and dwarfer, the less seed they will produce. The cost of seed of all large ones including the Grandifloras is high for the further reason that every flower must be hand pollinated and after this is done, not all will set seed!

Pansies

THE PROGRESS made in developing richly colored and large flowered strains of Pansies during recent years is responsible for the hold they are gaining on popular interest. When grown in a cool greenhouse and well enriched soil they develop all the striking color and long stem possibilities they possess — and in some of the present day strains these points are strong enough to give them real cut flower value. Aside from this their value as an attraction to a retail business is a real one. But under our mid-winter conditions of much dark weather they are inclined to accept it as an invitation to rest; but they wake up promptly, however, with the lengthening days of late January and are well in flower for Valentine's Day. For this winter crop we sow seed around mid-August and plant the seedlings about 4 inches apart into a frame, protecting with a partly shaded sash until relieved by cooler weather. They promptly take hold and in October or November are used to re-plant an empty Mum bed. Pansies delight in a soil heavily enriched with well rotted manure and we prefer to use a bed on the ground for during the spring months when growth is heaviest they completely fill the soil with roots and hold out longer-stemmed and larger flowered than on a shallow bed. We space them 12 x 12 inches but that leaves the bed looking rather empty. For a retail business they might be spaced 6 x 6 inches and alternate plants removed as they begin to crowd. Such plants can be used to advantage around Valentine's Day. As the growth becomes

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quite active around March 1, a light top dressing of 6-8-6 fertilizer will stimulate them and unless the growth has a rich dark green color and seems vigorous, this might be repeated April 1. During warm spring weather plenty of moisture is necessary to maintain vigor in any cool house crop and as spring conditions become more intense they enjoy a light shade.

Plants for Spring. Millions of wintered-over Pansies are sold from early spring to well into June and too many of them are just plain Pansies. This is usually due to very ordinary strains and as such they represent a loss to the grower for a little more money spent on the seed might be returned many times over. Seed for this important crop is sown any time in August in our latitude. A well-shaded cold frame is an ideal place to sow during mid-summer though it can be done practically as well in a well-ventilated and shaded house. Use finely sifted light or sandy soil with some peat. Such material drains promptly and this is necessary in a high temperature both to prevent seed rotting that might be somewhat weak and to prevent the seedlings damping off. Level the seed bed perfectly smooth to prevent undue drying in high spots or the water settling in the low ones. Before sowing, water the soil clear through. We prefer to broadcast the seed. When drilled in rows, unless it is spread thin, the seedlings soon become crowded and if rot starts, it sometimes goes through them fast. On the other hand, if broadcast evenly, it seems easier to uniformly cover the seed and get an even stand. But very good growers use both plans. After all, I suppose the proper plan is the one you have become accustomed to. Gently press the seed in the soil and cover just deep enough to hide the seed — no more — with a mixture of half light soil and half sand. Water lightly with a fine spray and if properly protected from the air it should not be necessary to water again until the seed comes through — a week later during the summer. When an out-door frame is used we cover the surface with several inches of straw; this holds the moisture uniform and keeps out high temperatures. It must be said that different growers will get various results from the same seed, from fine stands to total failures. Why? Careless handling or inexperience accounts for many failures, of course, especially during summer. We believe excess moisture explains much loss during this season as it does that of other summer sown seed, for the combination of high temperature and a saturated soil that doesn't drain promptly encourages rot. On the other hand if the soil surface dries too far as the seed is germinating it might also explain why one grower gets a stand from the same seed that another tells you is dead. But experience is valuable and somebody must pay for it.

After the pansy seedlings are large enough to easily handle, they are ready to transplant to well drained frames, spacing them about 4 x 4 inches. After the ground is frozen and cold weather is at hand,

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cover with sash tilted at one end for ventilation. The sash can be covered with any material that will exclude the sun to prevent too much thawing and freezing. Sash is ideal covering, but any loose material will do if the soil is well drained.

Pansy seed is more easily germinated around September 1 to 15 and if sown rather thin in a frame the seedlings can be wintered over without transplanting. This will make nice stock to take up sometime in March and plant into flats 2 or 3 inches apart. In this shape they sell as readily as do Petunias and are easily as profitable. Also the seed can be sown in the greenhouse in January rather thin and transplanted into flats in March or an open bed in a cold house; or into an out-door sash covered frame. When grown under the protection of a cold greenhouse the flowers develop cleaner and larger and are ready earlier for spring sales than the wintered over stock in the cold frame.

Varieties. Nothing is so attractive in Pansies as a well-balanced mixture and some choice ones are available. What is commonly known as "Improved Swiss Giants" is usually a fine moderately priced strain. With this is sometimes combined some extra choice stock to produce Super Swiss Giants. Usually you will get just what is paid for in these strains and the same can be said for the Super Maple Leaf Giants, the largest flowering strain available. This is an American product and is especially adapted to our climatic conditions because of its very strong heavy growth that enables it to hold up better and longer in high temperatures. However, the colors are not so rich as will be found in the Swiss Giants or Rogglii strains.

It must be said that \$5.00 should buy an ounce of a very good mixture of Pansies and it generally does, except in the extra large Maple Leaf Giants that do not flower so freely as do the more moderate sized strains. When stock is offered for much less than the above price you might be spared disappointment if you are after worth while stock, by letting it alone, for much costly roguing is necessary to produce seed of choice strains. It seems a natural law for the finest flowers to seed sparingly.

Among the separate colors that have been worked out of the Swiss Giants, Alpenglow, of reddish bronze shades comes quite true, Berna, dark velvety blue and a yellow strain are choice for producing separate color effects. Among lower priced strains, Golden Queen is practically a true deep yellow. Lord Beaconsfield for blue and a pure white are available. In Germany an early flowering strain known as "Maxima Hiemalis" is popular. In size this is between the regular pansy and the Viola, and is earlier flowering than either. Perhaps our uncertain spring weather would be against this class, but there should be sections here that would be suited to their early flowering habit.

Delphinium

DELPHINIUM are among the most valuable perennials for either out-door cutting or greenhouse forcing and are of very general interest to amateur gardeners. While the hot summers of our Middle States prevents us producing such stock as we see in more favored sections, much can be done thru thorough cultivation. Well-drained soil is very important and it should be occasionally limed. We have always found them enjoying a well-enriched soil. An excess of fresh manure might be responsible for the reputation they seem to have of not being able to stand much manure, but of course, there are other causes for occasional plants getting into distress such as grub worms, various forms of rot and, after the second season, with us, they rapidly lose vitality and must be turned under for a rotation crop.

For a field crop the seed is sometimes drilled in but under our conditions the result is rather uncertain. We prefer to sow seed around September 1 in an out-door frame and in well worked up soil, adding sand to it if at all stiff to prevent the loss of roots in taking up the seedlings. After sowing, which should be with fresh seed, we cover the surface with 2 to 3 inches of straw; this not only holds the soil cool, which even seed enjoys but it also maintains uniform soil moisture. This plan unfailingly germinates a fine stand and it works well with any coarse summer-sown seed. We should add that our frame is located in a cloth house. Under our winter conditions we prefer to protect the seedlings with shaded sash, tilted on one end, of course. They break into life early in spring, are well rooted and transplant more easily than a greenhouse sowing made in February or March: But this is frequently done. We space our plants 10 inches in the row with the rows $2\frac{1}{2}$ feet apart to permit cultivating with a large Roto-tiller. The September 1 frame sowing will flower substantially in July and the following season produce a heavy crop in June.

FOR FORCING

Delphinium are a profitable forcing crop if it is done successfully. In common with many perennials, notably Shasta Daisies, field plants lose vitality after the first season or two, especially where growing conditions are not favorable, such as too much hot weather or lack of perfect drainage. Hot summers weaken our Delphiniums. For this reason, when an attempt is made to force two-year old clumps, they generally rot out badly, producing only a fraction of a crop. No amount of careful watering will prevent it, in fact, we have planted them in fairly moist soil on deep beds and not watered at all until it was necessary a month later, without success. One year old plants usually do much better but we have had them fail, sometimes, as well.

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This might be due to our out-door soil conditions not favoring the development of clean vigorous clumps. With this experience, we strongly favor the use of one year plants only, or such as were started in a frame the previous September and given a season's growth in the field. The clumps should be dug late in the fall and wintered in a cold frame. A cold house built against the north side of a service building is much more convenient for this purpose than a cold frame, and is valuable for wintering other stock; in such a house the stock can be kept dry and cold and is convenient to get at. The Delphinium clumps can be started in January but it is more safely done in February for the same reason that Darwin Tulips are more successfully started later; it gets nearer their natural time to get going. And to get still closer to their natural start, do so in a low temperature — around 40 degrees at night. Another natural requirement is plenty of ventilation whenever out-door temperatures permit.

FORCING SEEDLINGS

Last fall we had a lot of Delphinium transplanted into flats, a few of which were not planted out. Just why they were left set around in the end of a house, I don't know, except that it was to teach us that these September-started seedlings would, in a cool house, come into fine crop about February 1. This experience promptly suggested the value of such seedlings rather than even year-old clumps for winter forcing. This will entirely get away from the danger of loss through rotting. We will not expect the long-stemmed flowers we get from the more costly year-old clumps but they will be long enough — especially for February. We plan to transplant the seedlings into an early Mum bed trying out both a raised and a deep one and spacing about 4 x 4 inches.

VARIETIES

When you get into the catalog of a specialist, particularly those from England, you will be amazed at the development in varieties and types of Hybrid Delphinium. At the Royal Horticultural Society's monthly flower show in London last June, I noted a full dozen varieties in double and single flowers ranging through all the richest Delphinium colors. The long spikes of the double varieties suggested glorified specimens of Column Stocks such as we hope to have in the future. Seed of these fine varieties, I believe, is offered but I feel sure they will prove more or less disappointing because of their hybrid origin. We must develop our own varieties of these types and such work must be carried on in our most favored sections.

The cut-flower grower's interest should largely favor the Belladonna type, a more dwarf freer-flowering class than the Hybrids. The light blue Belladonna Improved will be found slightly deeper in color than

the original strain. The improved strain is also known as Cliveden Beauty; it will produce around 5% of dark blue rogues. The variety known as Bellamosum is a rich dark blue with the same habit found in Belladonna. Like most cut flowers in this color, the use for it is limited.

The Hybrid strain, known as the Wrexham or Hollyhock type, is a choice one producing a fine array of colors with flowers of good size on long pointed spikes. The Blackmore and Langdon strain is another and by some growers considered superior to the Wrexham strain; it is exceptionally large flowered with heavier flower spikes. Both these strains are clearly superior to what is usually sold as Gold Medal Hybrids. Various shades of blue have been worked out of the Hybrids and are sold as dark, mid-blue and light. They come only fairly true to these colors. The new variety, Iceberg, a pure white, is the finest in this class and represents a color not much called for in Delphinium.

A real Cambridge blue in annual form was introduced last season. This belongs to the Chinensis class and is not so tall or vigorous as the Belladonnas. According to our experience with it the past spring the stronger-growing perennial form should be used for forcing.

Marigolds

UNDER THIS heading we have a varied and important number of classes and varieties of value to the retail and the wholesale grower. We will confine our notes to the most valuable starting with the smallest, Signata Pumila. This grows but 6 inches high and covers itself with small yellow flowers. It is valuable for bedding or edging and seems to thrive wherever summers are hot, which can be said for the entire family. The dwarf French single and double are next in height. Many of this class are used, particularly the brightly colored Legion of Honor. For flowering in 2½-inch pots for spring plant sales, sow in a warm house in February, not too thick and pot a month later. The double forms in this class are also colorful and effective for out-door planting. Robert Beist, Golden Ball and the striped varieties are popular and will get up 1 to 2 feet, depending on soil and climate. The Double Monarch strain, a fine mixture of doubles, is especially rich in bronze yellow and mahogany shades. Next comes the tall French such as Josephine that has some value among mixed cut-flowers. The new variety, Guinea Gold, ranks next. This is a loosely ruffled golden orange and very freely producing its fairly double flowers. No retail grower should be without an out-door row of this for all-summer cutting.

But the Giant Africans have real possibilities for greenhouse forcing. If sown early in October, they can be had in full flower, on nice stems, in January. For this early crop we grow them in 3-inch pots, plunging the pots well into the soil of a shallow raised bed. Use just ordinary

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soil for both bed and pots, and should the growth seem to be too free, it can be controlled by running the soil dry. We use the Giants largely to follow crops that are finished after Valentine's Day. The seed is sown about mid-January, in flats or an open bed. The seedlings are transplanted into 3 or 4-inch deep flats of ordinary soil, spacing them about 4 x 4 inches and carrying but one stem. A shallow soil that will confine the roots is necessary to prevent a wild growth that will not set buds. A 6-inch raised bed with about 4 inches of soil should do equally well for forcing the growth into buds. When grown in flats on a ground bed the roots sometimes work through the bottom; this promptly manifests itself by an increasing growth which must be checked by shifting the boxes far enough to break the roots' hold on the soil. The Giant Africans will draw up 2 or 3 feet when grown this way and they should be supported with at least one set of wire and strings. Some disbudding is necessary and must be attended to if the full possibility in size of flowers is to be attained. It occasionally happens that after transplanting into flats, the young plants will set buds at a height of 8 to 10 inches. This is due to some form of check to the growth, usually allowing the soil to become too dry. If favorable growing conditions are maintained, these early buds will draw up to a surprising height and produce good flowers. After the buds appear and are assured a light application of 6-8-6 will help the foliage and size of flowers. The soil should not be much enriched before planting for in this shape it might encourage too much growth before setting of buds, especially if much water is used. On the other hand virgin soil without manure is sometimes dead as far as plant growth is concerned until enlivened with decomposing organic matter in some form. The finest material for most crops is 2 or 3 year old greenhouse soil that has been wheeled out, spread some and sterilized by a winter's frost.

There are a number of Giant African Marigold strains and we cannot arbitrarily say any one is the best for their value depends on the care used by the seed grower. The "All Double" strain is a good one, usually giving us 75 to 80% doubles; but it seems to get this high percentage at the cost of size which hardly equals a good strain of Prince of Orange, or Orange Prince — a true *Fistulosa* or quilled-petalled type; its growth and flowers are some larger than the All Double strain but the percentage of true doubles is around 50%. All points considered, we prefer a good All Double strain. This, as well as the larger one, is available in lemon and orange. About three-quarters of a planting should be of the orange color. Primrose Queen is intermediate in color and rather attractive but not yet dependably true to its color type. The past season we were privileged to try a Giant strain that did not exceed 16 to 18 inches in height; this should have some value for cutting as well as garden planting.

The Giant African type is largely used for summer cutting in the open. To lengthen the stems and size of flowers they must be planted in deep rich soil and be freely watered in dry weather. A heavy mulch of manure helps greatly in conserving moisture. The out-door stock should be spaced at least 12 inches in the row and be disbudded.

Lupines

FOR A CROP to follow Mums, grown cool and flowering in spring, we find Lupines valuable for shipping to market and we are sure no retail grower should be without them for it is difficult to get long-stemmed blue flowers as early in the spring as Lupines are available. If their roots are confined to a 2½-inch pot, an August sowing can be forced into flower in mid-winter. The stems will not be over 14 to 16 inches long but most markets will accept them gladly at that time. The pots must be on a raised bed of a Carnation house; if the roots work through into soil the setting of buds will be delayed.

For 2½-inch pot plants to follow Mums we sow a few seeds in a pot not later than September 1, plunging the pots in an out-door frame where they can easily be protected until November in our latitude. There are differences of opinion as to whether Lupines call for an acid or an alkali soil. We have never considered this, growing them very successfully in ground beds that produced show Peas. Lupines are gross feeders but do not over enrich the soil for it tends to soften the growth that might be responsible for the tendency to rot out which sometimes causes serious loss. We are also of the opinion that permitting the plants at any stage of their growth to become quite dry, causing the main stem to crack enough to let rot germs into it, is responsible for this rot. We are fairly certain that this explains why *Malacoides Primula* and *Cinerarias* sometimes collapse prematurely with rot. Anyway we find that when the soil of our Lupine beds is kept fairly moist through the winter and rather wet toward spring as they get stronger, rotting out is negligible.

We find it most profitable to space our Lupines 12 x 12 inches. When the main stem can be disbudded, we do so, leaving 4 to 6 growths at the base to carry on, which they do with vigor after the center spike is cut away. This is strictly a cool house crop; a close damp atmosphere must be avoided as it encourages the weakness Lupines have for rotting.

The dark blue strain is the best market color though the light blue is a close second in cut flower value. White probably comes next and but little of the variety *Roseus* is wanted. *Sulphureus superbus* produces a heavier bushy growth with rather small spikes of yellow flowers that are out of proportion to its growth; of limited value.

Mignonette

SOME WELL-GROWN Mignonette is valuable throughout the winter and, being a coldhouse crop, it is not costly to grow, but a few details must be closely watched. Like Calendula and some other items, it is the early started crop that begins to flower about Christmas that really pays. We sow around July 15 to 20, dropping about a half dozen seeds in a 2½-inch pot.

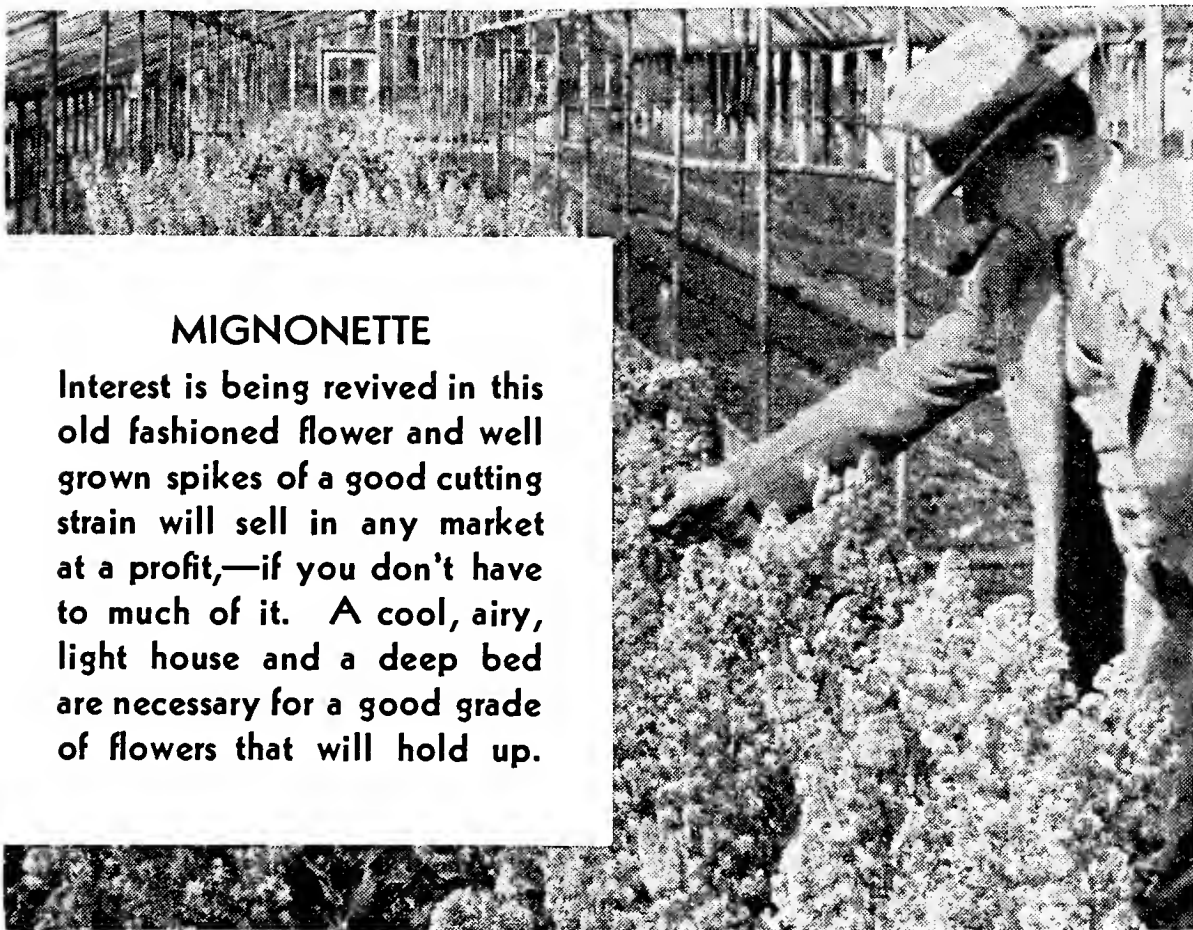
An out-door frame is the place for this start and after sowing, it should be closely covered with coarse cheese cloth to bar the common white and yellow summer butterfly. This pest will not fail to deposit its eggs on every Mignonette plant in a bed. They hatch into the green Cabbage worm that in turn utterly devours the plants overnight. These worms will sometimes appear though the plants are completely protected and is probably due to eggs laid about the soil or other material in the bed before screening it. With the plants in the flowering beds it is not so easy to build a protecting screen over them so we depend on Arsenate of Lead spray, diluting the material to about the consistency of milk — no danger in its use at all. And be sure to replace when washed off through watering.

After the seedlings are well started in the pots, thin out to the two strongest and after well started in the flowering beds, use a sharp knife to cut away the weakest of these two; if pulled out there is danger of disturbing the roots of the remaining plant. Mignonette is one of the few plants that will not stand transplanting or disturbing of the roots. To be certain that the plants will knock out of the pots without disturbing the soil, cleaned or new pots should be used.

In the seedling stage they are rather sensitive to an over-rich or wet soil. Such conditions cause them to turn yellow and for this reason we do not sow direct into the flowering bed. In pots they are, of course, well drained and do finely and if planted after they are well established they take hold promptly.

We space 10 x 12 inches in the bed and top nearly half way down when the plants are up 6 to 7 inches. This should draw up 4 to 6 vigorous breaks that must be promptly supported. If this is put off until the plants begin to lie over, it is difficult to ever get them nicely straightened up. The first wire and string support should be about 8 inches from the soil and at least 2 or 3 more are necessary later to keep the long stems perfectly straight. Disbudding must, of course, be regularly attended to, and along with most greenhouse crops, they must be fumigated for aphids.

This crop will stand a fairly well enriched soil to start with and later occasional top dressings of a well balanced fertilizer will be



MIGNONETTE

Interest is being revived in this old fashioned flower and well grown spikes of a good cutting strain will sell in any market at a profit,—if you don't have to much of it. A cool, airy, light house and a deep bed are necessary for a good grade of flowers that will hold up.

used to advantage. Mignonette enjoys a low temperature — 40 to 45 degrees at night and a better grade is grown on a raised bed close to the glass than on a ground bed.

A crop can be started later to plant after Mums but it will come in with the spring over-supply of flowers and it cannot be compared for profit with the mid-winter crop. However, if early-started 3-inch pot plants are planted out after October Mums, they should get into crop beginning around Valentine's Day. Do not fail to use a long-stemmed forcing strain. Such varieties as Bismarck, Goliath and Machet are dwarf and used for bedding only.

Part of all Mignonette seed will be found white and is generally considered worthless. If an equal number of white and dark seed are tested the germination will be found but slightly in favor of the dark seed.

Cinerarias

ONE OF OUR most showy and easily grown pot plants that have become particularly popular in recent years thru the various types of growth and bright colors that have been developed. By sowing about the 15th to 20th of June, 5-inch pot plants can be flowered in December and some of the straight crimsons such as Kermesina in the Grandifloras and Dark Crimson in the Berlin Market class are well received about the holidays. So are the straight blues. Both these colors are available in strains that come 95% true.

We prefer to transplant our seedlings to flats about 2 inches apart and when they begin to crowd, shift to 3-inch pots. A light open soil that will drain promptly with some peat moss and a little bone meal will grow fine Cinerarias. If a well-ventilated cool house is not available for summer growing, they are better off in a frame with a lightly shaded sash over them. They enjoy overhead spraying on warm days but during the winter this must be avoided for the foliage is easily damaged by rot. Another point that helps make for well-rounded foliage and shapely plants is proper spacing. Don't overcrowd. They enjoy all the sun available during mid-winter, but some shade will preserve the color of the flowers during spring months. After the plants are well rooted in their flowering pots, a light top dressing of a balanced fertilizer will tone them up.

Seed can be sown thruout the summer and up to October and nice 4-inch plants are produced for late spring by sowing in November. Such plants can be popularly priced. A night temperature around 45° suits them, and after the pots, in any size, become well filled with roots they call for much water. They are occasionally disappointing in a dry living room because the amount of water they require is not appreciated, and when plants are sold, this point should be stressed. A good plan to suggest is that the pots be immersed in water daily.

A rot sometimes sets in at the main stem that we believe is started by a bad wilt, collapsing the tissues thereby permitting the germs of rot to get a hold. Greenfly is particularly drawn to Cinerarias as well as Calceolarias and for the sake of these plants, if for nothing else, fumigating must be attended to regularly; if applied thoroughly, every two weeks should do. Don't depend much on tobacco stems between the plants to keep aphids from these plants.

Types. The largest growing and perhaps flowering strain we have comes from California and is known as Giant Exhibition Mixed. Its strong growth makes it valuable for outdoor planting in partial shade, but only where temperatures are moderate, such as along the coast section of California. This strain also makes fine exhibition plants, but it is not so much favored by market growers as are the more compact growing types. The next strain in size of growth is generally

known as the Grandiflora type and is available in a full line of colors and mixture. Large flowered and of fairly tall growth, this is a splendid and a popular class. What is known as the Potsdam or Berlin Market type is next in size of growth and flowers, though little behind the general Grandiflora class in height. In most strains of this, the flowers will be found of medium size, freely produced on heavy heads. It is a well-liked all-around class and is available in colors and mixture. Next, and smallest in growth and size of flowers, is known as Multiflora Nana. This is available, as yet, only in mixture; it produces very neat compact plants that are attractive to buyers especially when offered in the smaller sizes.

The above are the principal classes; there are special strains being worked out of them for improvement in Cinerarias that as in all other classes of cultivated plants, is ever going on. The Cremer strain of this season's introduction is an example of this. The foliage of this strain is somewhat restricted in size and its medium-size flowers are produced in immense heads. The Stellata or Star Cineraria is a distinct type growing up to two or three feet and producing in great profusion, medium to rather small star-shaped flowers. The plants are valuable for show and decorative purposes and when not used in any other way, their long stems make them valuable for cutting. A distinct double-flowering strain known as Plenissima is available. It is of medium height, producing perfect round double flowers about 1 inch in diameter and in a mixture of colors. It lacks the showy effect of the singles, but has some value as a novelty.

While mixtures in Cinerarias are most popular, especially when brightened with plenty of light eye types, attention should be directed to some rich straight colors in which blue and crimson are most popular. Good strains of these colors are attractive and will come fully 90 to 95% true. A copper scarlet known as Matador is distinct and rich, but not so popular as is blue, and especially crimson, which is listed as Kermesina. Another known as Old Rose we find of little value. White is still another color that is always left in a lot of colors that have been picked over.

Calceolarias

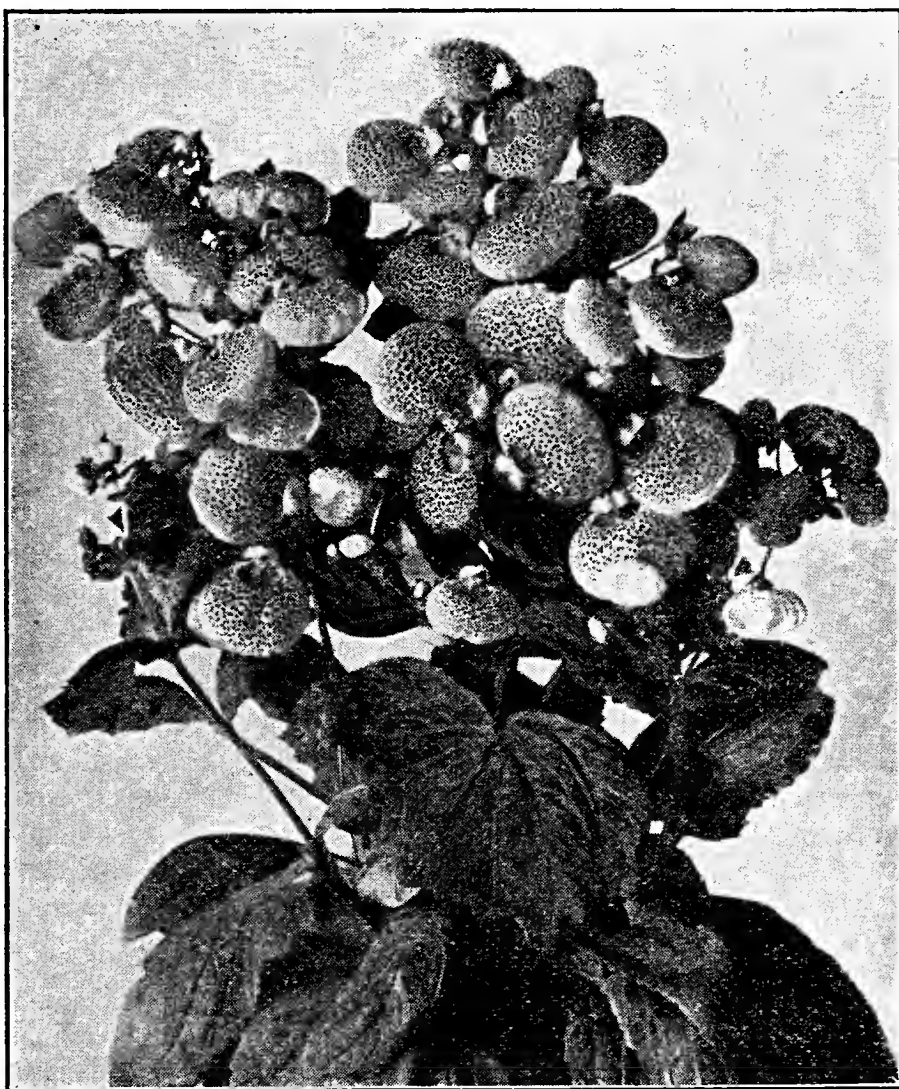
WE BELIEVE that if florists generally realized how easily Calceolarias are grown, more of them would be seen and sold. Last season we produced the nicest lot we ever had in a house that wasn't much above freezing in severe weather. They go along well with Cinerarias, though more shade must be used, especially when in flower, and perhaps more care in watering for they will turn yellow if overpotted or kept quite wet at the roots. Watch the watering closely for they will not stand neglect on this point. This rather weak point in their nature might explain why some look upon them as being difficult to handle, but a grower who cannot use enough care to carry thru a lot of Calceolarias is not likely to make much of a success with anything else under glass.

Seed is sown from early June to late August and usually they can be gotten in for Easter, but are at their very best during May. Among the seed growers of Germany, they are at their very finest a month later, but they do not have the occasional early hot spell to destroy them that we have.

Equal parts of light sandy soil and leaf mold make good material in which to grow them, but it is necessary that it contain some sand to insure water passing thru it promptly. Also the material must be light because they are not a vigorous rooting plant. We prefer to start the seedlings off by transplanting into flats, from where they go into 2½-inch pots. By December they should be in 4's. As a rule, we do not recommend the use of drainage material in the bottom of pots for the porous nature of clay pots in addition to the drainage hole makes it unnecessary, with few exceptions, and one of these is Calceolarias. If enough care is used in watering, it might not be needed for them, but it is safer to use it. And in watering, especially in mid-winter, see to it that the foliage promptly dries off or rot will set in. And do not overcrowd at any stage of their growth. About the same temperature, 45° nights, and a house that suits Cinerarias, will do for the Calceolarias. After they are well established in their final shift a light top dressing of concentrated fertilizers such as Vigoro or 6-8-6 can be used to advantage, but use less than a teaspoon of these materials and only for plants in vigorous growth. You can easily gain or lose in the use of these concentrated materials.

VARIETIES

There are two classes of Calceolarias, the usually smaller flowered shrubby Rugosa class that is much used in Europe for bedding and the so-called Herbaceous kind that is grown from seed and so largely used in America. Considerable crossing between these classes has provided a number of distinct varieties, but a good Grandiflora



Calceolaria Hybrid Multiflora Nana

mixture of the herbaceous class is usually depended upon to produce larger plants with a highly attractive array of colors with plenty of spotted and tigred effects among them.

Some distinct and choice mixtures come to us from abroad; Kelway's Perfect Model is one of them and Albert Kent Hybrids is another. Among distinct colors Cloth of Gold is a fairly deep clear yellow. Albert Kent is a golden yellow with a large maroon blotch on each flower that partly covers it. This is fairly dwarf. The outstanding recent introduction is a strain known as Hybrid Multiflora Nana. It is distinctly dwarf — about 10 inches with medium sized flowers ranging in color from scarlet down to crimson orange and yellow shades with plenty of spotted ones. The habit of this type makes it an ideal pot plant or to use in filling mixed plant arrangements.

Schizanthus

THIS CROP easily produces a profusion of flowers under coolhouse treatment. For winter flowering, the roots must be confined to a shallow raised bed or pots. If grown in pots it can be flowered in December if sown about mid-September. To get shapely plants they must be topped occasionally. During the dark months Schizanthus will not flower until they become pot bound. 2 or 3-inch pot plants planted out on a shallow raised bed in December will flower freely in February, and the flowers have considerable cutting value for a retail grower. Or if the pot plants are kept shifted and topped they can be grown into real specimens by early spring such as you see at the spring shows. The size of individual flowers and the rich and wide range of colors of the Grandiflora type are not as widely appreciated by retail growers as they should be. This improved class is available in separate colors and mixtures. The Wisetonensis type is not as large but the colors are choice; the new variety, Brilliance, an amaranth red, is especially rich.

Nemesia

FOR OUTSIDE planting this annual has some value where summers are hot and dry, but under climatic conditions such as the coast sections of California enjoys, these dwarf showy plants quite cover themselves for two or three months with small bright flowers. By sowing early they can be flowered during mid-winter and they make useful small pot plants with 2 or 3 in a pot. The improved taller growing class is long-stemmed enough for small cut-flower work. They are most useful during the spring months and for flowering at this season, sow seed early in February; transplant into flats and later into small pots.

The Strumosa Suttonii class produces large flowers on 10 to 12-inch stems and is available in a half-dozen distinct colors from white and rose to scarlet. Compacta Blue Gem is a choice shade, but the most dwarf is the Nana Compacta group. A choice variety in this class is the new "Aurora," a carmine and white combination.

Scabiosa

BOTH THE annual and perennial forms of Scabiosa are valuable and largely used for cutting. The annuals can be forced into spring cut flowers though they get rather soft when exposed to high temperatures. Sow seed around January 15, carry the seedlings along either in pots or an open bed and plant out about March 1. In a deep bed, they make a heavy growth and should be allowed at least 12 x 12-inch spacing and two sets of wire and string supports.

The "BALL RED BOOK"

This planting will flower freely for the two valuable May flower days. A sowing early in March and grown along in small pots will make strong plants for outdoors where they will flower heavily through June and July. An out-door sowing late in April will come in the last of June, but the early-started plants are more profitable. Azure Blue is a choice color and one of the best. The new Loveliness is a rich salmon rose; Peach-blossom pink is also choice. The reddish black, King of The Blacks, is striking where that color can be used.

The perennial class of Scabiosa, like the annual, does not enjoy hot summers, though we sometimes note them around Chicago in fine shape. Where summers are not so trying, the perennials are large, richly colored and freely produced, especially the Columbaria varieties that are available in lavender and an orchid pink. This class is not so long stemmed as the Caucasica type, but much more free flowering. Among the Caucasicas, the strain known as House Hybrids, that ranges in color from rather dark to light blue, is the choicest available and should be depended on for cutting. It varies some in color from deep to light lavender. We prefer to sow most perennial seed in an out-door frame in September, covering the surface after sowing with an inch or two of straw to maintain it uniformly moist and cool. This is a real help in germinating summer sown seed. It works well with pansies too. Most of the perennials handled this way are not transplanted and for this reason must not be sown thick. After the ground is frozen we prefer to protect them with shaded sash, tilted on one end, but if the frame is well drained and in more southerly sections, this is not necessary. As early in the spring as the field can be put into good shape and the frame seedlings get into growth, they can be transplanted. Such plants will be much stronger and will stand field planting far better than greenhouse grown stock that is started about February and transplanted into flats and is rather soft when put out, but that can be done very well if the fall sowing is not attended to.

Two year old plants of Scabiosa can be lifted late in the fall, stored in a dry cold frame and brought into a cool house for forcing. If brought on slowly, they will produce beautiful flowers in May. It requires fully two weeks for the seed to germinate and not over 25 to 30% of most lots of fresh seed we ever tested will come. In Europe, where climatic conditions are so much more favorable for most out-door stock, hardy Scabiosa can be seen in exceedingly fine shape. But if we treat them as liberally and carefully as they do there, the result would be very good in most parts of our country.

Candytuft (*Iberis*)

THERE ARE two distinct types of this used for cutting, the Umbellata that produces large heads of umbellata flowers with a range of colors, and the Hyacinth type, producing long hyacinth shaped white flowers, usually 3 or 4 to a plant. The last named is the more profitable. No attempt should be made to flower this during the winter months. We sow around mid-January and transplant after St. Valentines day in a cool house, spacing about 6 x 8 inches. The seedlings can also be carried along in pots for later planting. Either a raised or ground bed will do, though we prefer them on the ground for the same reason that most crops have a better chance on ground beds during the spring months. At this busy season water is usually the limiting factor in crops on raised beds. Well grown Hyacinth Candytuft requires at least 2 sets of wire and string supports and the first one must go in before the young plants fall over. No disbudding is necessary and under cool house temperatures, the late February planting comes in around Memorial Day. The pure white flowers on long stems usually sell well for that occasion. Giant Hyacinth flowered white greatly improves the old Empress variety. Under favorable growing conditions, it makes a good out-door crop if planted out of small pots or seed beds. Seed sown out-doors in our latitude usually produces short stemmed flowers. A selection of Giant Hyacinth, known as Little Prince, makes a height of but 6 to 8 inches and is useful as a pot plant.

A yet further selection for dwarf habit has given us Miniature Gem, about half the height of Little Prince. Both are useful for rock garden work.

Our objection to the Umbellata type of Candytuft is the fact that the flowers shatter rather easily under glass if not cut out promptly when ready. But there are several colors that will be welcomed in any market. They are a clear lavender and Rose Cardinal. We sow this class with the Hyacinth kind, but space more liberally, 8 x 10 inches for individual plants makes a big spread. One set of wire and strings will support them. For out-door work, they flower on rather short stems. The value of *Iberis Sempervirens*, a perennial for rock gardeners, should be noted. Pure white, flowers in July, about 12 inches.

Gerbera (African Daisies)

THIS CROP is grown by most growers with indifferent success, and profit. It is either difficult to duplicate their native growing conditions or they do not naturally flower freely enough to be profitable under present economic conditions. The chances are that in their native state they are as we see them in Florida, where they are not at all to be compared with well grown greenhouse stock. The flowers hold up well when cut; their value is unquestioned, the problem is to get production. It must be admitted that the most successful greenhouse growers of this crop we have noted are to be found about New Jersey and Long Island where the soil seems of a sandy clay nature, even to gravel in places, poor looking material to one accustomed to a black prairie loam. But usually our more favored appearing material is underlined with a stiff impervious clay that lacks free drainage and we believe this is of real importance in the growth of Gerberas. The most successfully grown crop I have ever seen were in high modern houses and ground beds with two foot sides. This provided real depth of soil and, of course, drainage was well provided for. Two separate watering systems were noted in these houses, one for liquid manure and this was freely used, if we were to judge by the vigorous growth and long stemmed flowers. The question is frequently asked, "What shall we feed this or that plant?" Nearly all plant growth calls for a balanced ration. Whether your particular soil needs more of one element than another will, of course, depend on what has been recently put into it. As a rule, most plants respond to nitrogen and phosphate. This question is a complicated one and the guess work connected with it will be overcome if we ever learn to grow our plants in clear sand and apply fertility by formula.

A cool house — 45 to 50° nights — is sometimes recommended for Gerberas, but the grower referred to uses 55° nights. One cause for many unprofitable greenhouse Gerberas is, no doubt, lack of heat. We feel safe in saying that the higher temperature is necessary for profitable production. Free ventilation must be provided with this higher temperature to check the tendency the large flowers will have of bending the stems. Also the flowers must be well developed before cutting if they are to last well. Another well established point is that the planting time, whether divisions of old plants or seedlings are used, is June. This allows plenty of time to become well set for winter. Well grown plants call for a spacing of at least 12 x 12 inches, but with seedlings we use a closer spacing. This permits the removal of undesirable types that will appear in any lot of seedlings, thereby raising the standard of what is left. Gerberas are easily grown from seed, but the grower should count on little over 50% of even fresh seed to germinate; even under the favorable seed growing conditions of

California, it doesn't develop as most seed does. To produce good 3-inch pot planting stock for June, the sowing should be done early in January in a bed with some bottom heat. We prefer to sow rather thin and not disturb the seedlings until March when they go directly into 3's. Strains of seed are offered in separate colors, but we find it little better than the regular mixture that will produce from 25 to 50% off types in color and habit, the proportion depending on how critical the grower wants to be.

It is from seedlings that fine true color strains on long stems are worked up. In selecting plants for this purpose, their record for the season must be considered, for plants will sometimes produce exceptionally fine flowers but not freely enough to pay their way. If plants are bought, it should be understood that, generally speaking, they will be seedlings and if they are out-door grown clumps that have flowered, there is a chance that the choicest specimens have been selected from them. Fine strains of separate colors are sometimes offered, but the most dependable way to get them is from one's own seedlings.

Gerberas are available in the double form, but from divisions only. This type has not met with much favor for they lack the size and long graceful stems of well grown singles.

The striking beauty of these flowers combined with their keeping quality makes them well worth some special attention. It is crops that are not so easily grown that offer chances for exceptional profit, especially when time and patience are necessary to work up good strains. Gerberas can be classed as half hardy and in sections where winters are mild, they should be dependably so, with slight protection.

Didiscus

BLUE LACE," as *Didiscus Coeruleus* is commonly known, is an easily grown annual. The pale or lavender blue flowers are choice for work and at least a part of a bench should be grown by every retail grower. For wholesale markets it is like mignonette — not very much is needed. For a fall and winter crop, sow about August 1. We prefer to sow directly into pots for the seedlings do not transplant easily as some plants do. The winter crop should go on raised beds in a carnation house temperature spacing about 10 x 12 inches. The growth is susceptible to a form of rot such as destroys Lupines. To control this, a low ground bed that does not get a free circulation of air and doesn't dry out promptly should be avoided. Also avoid too much fertility, especially nitrogen that softens growth; also ventilate whenever possible, and avoid watering late in the day. Be certain to allow the soil to dry fairly well between waterings for this tends to harden and invigorate the growth and is probably the most important

precaution in avoiding the rot that cuts down many greenhouse plants during the depth of winter. *Didiscus* is a nice crop to follow *Mums* and if sown in December and carried along in 3's it can be used to plant after Valentine's Day. It can also be used as an out-door crop, but like all out-door stock, unless watered and planted in rich deep soil, the intense conditions of mid-summer produce short stemmed flowers.

Gypsophila

BOTH THE perennial and the annual elegans *Gypsophila* are heavily grown for cutting. The principal cultural requirement of both is a well drained soil, in fact the annual form under glass must be grown in either shallow beds or flats to prevent a free soft growth that will produce few flowers. The seed can either be drilled in rows and thinned or the seedlings transplanted 3 or 4 inches apart. It is largely used as an out-door crop, the seed being drilled in rows that are spaced about 18 inches. The popular variety is known as *Paris Market*, a fairly large 5-petalled flower. The past season a strain known as *Covent Garden Market* has been offered; the true type of this has 8 overlapping petals with larger flowers than *Paris Market*. However, it cannot be depended on to come entirely true to this type. And still another is available, known as *London Market*; this is of somewhat taller growth and larger flowered than either. There might be some question as to how far we should go in size of flowers but it is clear that the overlapping-petal type is more attractive than the original form that leaves space between the petals. Another annual form known as *Carminea*, a rather deep carmine, impresses us as having more value than *Rosea*, a blush shade.

The perennial form is known as *Paniculata alba* and is available in both single and a strain that will come about 40% double. This double form from seed is of fair size and is not equal in uniformity to the several fine strains that can only be had grafted on the strong growing single type. *Gypsophila Pacifica* is a perfectly hardy perennial, light rose and single. Our trial of this doesn't open its flowers as uniformly as do the others.

Statice

WITH THE recent introduction of new forms and colors in both the perennial and annual classes of statice, its commercial value for cutting has become considerable. None of them will tolerate lack of drainage and, when planted in the field, they enjoy a deep rich soil. Among the annual forms for outdoors, the Sinuata group is largely used. We prefer to sow under glass in March and transplant to the open, spacing about 8 inches in rows 2 feet apart though this will depend some on the form of cultivation used. Also, a sowing can be made directly in the open. They flower early in summer and can be used fresh or tied in bunches and stored in a dry shed and used when wanted. All the varieties of Statice dry perfectly except *Suworowii* and it is this everlasting nature that gives it commercial value. We have noted the Sinuata used for greenhouse growing and while they develop better than in the open, we can hardly suggest them for this purpose. The two choicest Sinuata colors are True Blue and Rosea Superba. The lavender is a rather weak color; so is white. *Bonduellii*, tho not a flat-stemmed Sinuata, is similar in habit and flowering, and light yellow in color.



Statice Suworowii as a pot plant; also valuable for cutting.

Statice Suworowii is the one valuable greenhouse variety. It should be sown around mid-August, grown on in small pots and when ready, planted out in a cool house, 45 degrees nights, on a raised bed, about 10 x 10 inches apart. Or, if 3 small pot plants are planted into

a 6-inch, attractive pot plants can be made of this variety. After they get well into growth, light top dressings of a balanced fertilizer will stimulate the production of their long, rose-pink flower spikes. A deep ground bed will also produce fine growth and flowers, but care must be used in watering, for if water stands in the crown of the plants, rot will set in.

No material combines more effectively with any cut flower arrangement than the various forms of perennial *Statice* and no retail grower's stock is complete without it: as soft and dainty as *plumosus* in its effect and more colorful. In our latitude it sometimes freezes out especially after the second or third season, but where the protection of snow is more dependable, or further south where temperature changes are not so extreme, perennial *Statice* can be depended upon for a number of years.

The varieties *Latifolia*, a fine clear blue, and *Caspia*, soft lilac, require two years to become blooming-size plants. *Statice Perezii* produces heavy broad leaves and its fine long-stemmed flowers are ready in August from spring planting. *Perezii* is long-stemmed, 3 feet under favorable conditions, with rather large violet blue flowers. *Incana* (*Tatarica*) is a small white-flowered and fairly tall variety. *Dumosa* produces silvery gray flowers, rather short-stemmed for cutting, but well adapted to rock gardening.

Centaureas

UNDER THIS heading will be found several much-used cut flower and bedding plants. All of interest to us are annuals. *Centaurea Cyanus Americana* and *Imperialis*, prefer moderate temperatures.

Centaurea Cyanus (Corn Flower or Bachelor's Button) is valuable for both greenhouse and out-door growing. For indoors, it belongs to the class of annuals that is not profitably forced into mid-winter flowering but gets into fine shape with the lengthening days of spring. If planted after mums, especially if in a ground bed, they produce a heavy soft growth that easily rots when the house can't be freely ventilated. We prefer to sow seed early in January and transplant the seedlings after Valentine's Day about 12 x 12 inches. This planting will produce just as long stemmed flowers as an earlier one; wire and string supports must be provided. A sowing made in February and carried along cold in 3-inch pots will make fine material to plant into an out-door frame. For May and June flowering; they will do well out in the open in our latitude, flowering until hot weather. They are extensively used in Florida for mid-winter flowering. Fully three fourths of a planting should consist of the blue, though the rose colored one is good. The other colors we find of little value. Both the blue and rose are quite double-flowering.

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Centaurea Imperialis (Sweet Sultan). This class makes a choicer cut flower than the Cyanus type but the plants are inclined to rot out easily unless the watering is done carefully; apply water only when needed and early in the day so that surplus water will be well dried off before night. This rotting tendency will show up on either a ground or a raised bed. But a poorly drained deep ground bed should be avoided. A half dozen colors are available in the Imperialis Class and all are choice though Amaranth Red is a rather dull one. *Centaurea Suaveolens*, a bright yellow, is of this type. Use the same sowing dates and spacing as suggested for the Cyanus class.

Centaurea Americana. A large flowered species not adapted to forcing but makes a good out-door cut flower. Seed can be sown indoors early in March and the seedlings planted out later in May or seed sown in the open. Unlike the other classes, the flowers hold up well during the summer. The flowers will last better if cut close, especially if shipped. Two good colors, lilac and white, are available.

Centaurea Gymnocarpa. This is generally known as Dusty Miller and is an important bedding plant, its silvery-gray foliage contrasting effectively with many plants. Sow seed around February 15 and grow cool in 3-inch pots, though 2½-inch will do. While the variety *Gymnocarpa* is generally used, the variety *Candidissima* grows heavier and broader leaved.

Annual Wallflower (*Cheiranthus Cheiri*)

THE Biennial Wallflowers are much used in Europe where climatic conditions favor their perfect development. Their delightful fragrance and rich colors are increasing their popularity in America for they develop perfectly under our early spring conditions. But the flowers do not hold up under our hot spells such as occasionally set in in May.

Seed of the biennial class should be sown early in spring and the young plants set out doors in May where they should develop into plants large enough for 5-inch pots. They should be taken up and potted in October after which they enjoy a dormant period until early February when they can be brought into a cool house. Successive lots can be brought in to avoid having all the crop in at one time. The plants in pots have value for cutting as well as pot plants.

Annual Wallflowers. A double annual class is a recent development and a valuable one both for cutting and pot plants. In a carnation house temperature this class will flower in 5 months from sowing seed; but, according to our experience, the flowers will not open satisfactorily in mid-winter. We have not tried them in more than a carnation temperature but we believe it is lack of sunshine that explains the fact that the lower flowers fade away during the

dark months before the flower spike lengthens beyond 4 or 5 inches, while under favorable conditions they draw up as long as a non-branching Stock.

We advise two sowing dates, November 1 and December 1. This flowers them early in April and May. After late May the heat is too much for them in our latitude, but the reader should remember that our trying climatic conditions do not exist in all parts of America. The time required from sowing to flowering should regulate the sowing date, bearing in mind that to develop the flowers perfectly for a nice distance up the spike or stem a normal amount of sun and moderate temperature is necessary.

As noted growing in Erfurt, Germany, the past June, this type of Wallflower was truly magnificent in color, long flower-spikes and rich odor. They are grown there under partial shade and in 5-inch pots set on shelves for seed production. An equable temperature and long daylight hours are responsible for this development that cannot be equalled under the climatic conditions of Chicago. But if the flowering is timed for our favorable season — March, April and part of May, the annual strain of Wallflowers will be found a highly attractive novelty, both as a pot plant and for cutting. They flower nicely in a 4 or 5-inch pot and for pot plants should be topped at 6 to 8 inches.

For cutting, we treat them as we do non-branching Stocks, except that spacing should be not less than 8 inches between rows and 3 inches in the row. All Wallflowers are closely related to Stocks and resent a close warm atmosphere. The finest variety is a deep golden-yellow — well-known as "Gold Standard." Several other varieties in various shades of brown and gold are also available.

Recent Introductions in "Flower Seeds For Florists"

WE WANT to make it perfectly clear that in setting down our opinions or experience on this important subject that it is open to criticism. Our business is made more interesting by the fact that varieties are so frequently exposed to varying conditions and they react accordingly. Frequently enough too, the grower does not give new varieties a fair break. The writer was privileged to try out the Early Sweet Pea, Harmony, before its introduction. Our report condemned it as being a weak grower and we suggested it be dropped. It developed that the soil in which they were planted was full of eel worms. Since those early days we have found out that when our crops fail to behave it is not necessarily the fault of the variety. Most of our novelties come from California and occasionally they disappoint us but considering the great climatic dif-

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ference, surprisingly few new varieties come from there that are unsuited to our more trying conditions.

Another factor that influences our judgment of varieties is the varying color preferences we meet. However, few of us deal exclusively with any class of trade, in growing Petunias for instance, we must have some of the dark heavy colors as well as the more subtle ones that our Gold Coast customers select. And sometimes there is no accounting for color tastes.

In the following comments on a few varieties we will try to keep in mind these varying demands and the immense variation of climate within the bounds of our country, that so markedly influences them.

Nasturtium Golden Gleam. No retail grower should miss this, for its value as a winter cut flower and for spring plant sales. For winter cutting plant on a raised bed. We have seen it covered with flowers at a height of about 18 inches, growing in 16x6x6 inch boxes. In this form it is highly attractive. This is a moderate temperature plant that does not flourish under the hot summers of our midwest. Next season may release a red variety of this sweet scented nasturtium and no doubt other colors will follow.

Verbena Lavender Glory. Comes around 60% clear dark lavender with light center, balance white with a few purple. Since most verbenas are permitted to flower before using a good clear stock of lavender can be had in this strain from seed, but some use must be found for the white rogues.

Verbena Beauty of Oxford Hybrids. For a rich large flowering mixture this is choice. Introduced last season with poor seed germination. Whether or not this is the nature of the variety we cannot say.

Statice Sinuata Atrocoerulea. This seems the choicest clear blue among annual statice.

Salvia Dwarf Fire King. The dwarfest early flowering lot in our trials the past season. Almost too restricted in growth unless conditions are favorable. We also had several strains of America, one "Globe of Fire," that was much superior because of fairly dwarf, uniform growth and early flowering. The variation in height and time of flowering of various strains of America leaves some of them worthless in our latitude. They are an example of the fact that the value of a variety or strain depends on the care used by the grower.

Annual Canterbury Bell. Under our hot summer conditions this distinct annual form does not hold or produce its flowers satisfactorily.

New Summer Sweet Pea Bonny Briar. Rich rose pink about the shade of Pinkie with an amber suffusion that lights up in a most attractive way under artificial light.

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Petunia Celestial Rose. We find this a distinct improvement on Rose of Heaven in that the growth is more compact and the color deeper. Also, we find it produces few rogues.

"All Double" Petunias. A foreign strain will be released next season that, for want of a better name, will be known as above. It will be available in two strains: a rather tall one and a more desirable compact growing strain. In addition to its compactness, the latter is choice for its rose-pink and white color combinations. We have had some small trials, about 25 plants each, of both the past two seasons and we are glad to state that all were double including about 15% semi-double. We much prefer the habit of the dwarf strain to that of most strains of doubles available. However, adverse reports have also been received on these new strains and we believe it a mistake to expect them to live up to their 100% reputation. But should they drop to 80%, a decided advance will still be available in double Petunias.

Scabious Flowered Zinnias. The formation of the flower somewhat suggests the name. The true type is distinct and attractive but the past season's stock developed considerable variation.

Lloydii Begonias. In a night temperature of around 55 degrees, beautiful specimens of this choral-red double flowered type are produced in 6 months from sowing seed. 10 to 15% of the flowers will come single but the balance are superb. The growth has a distinct pendulous or trailing habit, giving it special value for choice basket or window box work. We would not hazard its full exposure to our sun, though we have seen it used for bedding in Europe where climatic conditions are not so severe as with us. Out enthusiasm for this Begonia is not based on its behavior under European conditions. We started a lot of seedlings February 1 and under rather cool house treatment had choice 5-inch pot specimens by mid-summer. We believe it to be of summer flowering habit and that it can be propagated from cuttings.

Begonia Carmen (Gracilis). Shining dark foliage with medium light pink flowers. The dark brown foliage makes this new variety of outstanding value.

Double Fringed Shasta Daisy. As seen in California where Shasta Daisies are at their best, this recent development is attractive. For cut-flower purposes it is difficult to improve on a perfect single Shasta, especially when the center or disc is small. For landscape work, especially where these Daisies can be depended on to winter over, the fringed form will be found valuable. We have a very unfavorable climate about Chicago for wintering over these Daisies; also many other perennials that are more dependable north of us where protecting winter snows are more constant and south of us

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where winters are less severe and not open to such extreme and sudden changes.

Venidium Fastuosum. A new South African annual, brilliant orange with dark center, that seems to enjoy a Carnation house temperature, an open sunny bed and light, open soil. It seems to weaken and flowers lose their size in a high spring temperature. If started in August it will flower in mid-winter. Flowers should be fully developed before cutting or they will wilt and close easily. Germination of seed seems uncertain for reasons we cannot explain. The past summer a lot of newly harvested California seed failed completely for us while some of our greenhouse grown seed germinated 100%. We should add that this is the reverse of our usual experience with seed produced under California conditions and it may have been due to lack of maturity.

Saintpaulia Ionantha Cordata. This newer variety is distinguished by the deep lavender color of its flowers. The darker cordated leaves also add an outstanding point. The flowers of the original variety, *Ionantha Grandiflora* are a dark violet blue. We clearly prefer the new one. Saintpaulia seed requires about 3 weeks to germinate in moderate temperature and nice blooming plants in 3-inch pots can be produced in 6 to 8 months. They require light sandy soil combined with plenty of humus and exposure to sun will burn the foliage.

Cost Finding or Where the Money Goes

By Geo. Ball, Jr.

IN DAYS PAST our forebears in this industry, with a few notable exceptions, operated to a considerable extent, a "one man business." They did most of their own labor, with the aid of hot-water boilers, did their own firing, were their own foremen and bosses and last of all, carried the purse of the enterprise in their pockets — literally. When there were any bills to pay, the worn leather wallet opened up and paid them and when a sale was made, the wallet opened up and received the money. Accordingly, if the wallet grew fat and an "overflow" had to be found for the surplus, the business prospered — as it usually did. However, more recently this picture has changed considerably and in an increasing number of cases we find the old wallet flatening out to an alarming extent. What are we to do about it?

We are advancing in this short chapter not a substitute for the "Wallet" system but rather a simple system of cost-finding that may well be used in conjunction. This system does not claim to make dollars and cents immediately upon its adoption but we believe it might help some one as it has helped us, to operate our business a little

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more efficiently and economically to the cause of fattening that wallet.

Our system has as its unit of operation an individual crop by which is meant a crop of flowers or plants from the time the seed is purchased, cuttings bought or made, or the crop otherwise started, until it is cleared from the bench and all sales from it are made. Let us follow a crop of say, Sweet Peas, through from start to finish and see what happens.

With the exception of labor and overhead costs (costs that cannot be placed wholly and directly against an individual crop) all items of expense are listed separately on a cost summary sheet, an ordinary letter size sheet ruled off in columns that are headed as follows: "Labor," "Material," and "Receipts." At the bottom of the page space is provided for a summary of the tabulations ending in a net profit or loss figure. See reproduction of of this form on page 86.

In order to keep account of all labor put in on a crop and to separate time put in on different crops the same day, our system calls for a series of time cards filled in by the employee as he goes from one job to another. These are 3 x 5-inch cards with space for the employee's name or number, the crop number worked on, the date and provision for indicating the time spent on the crop. Also a space is indicated for the money spent on this particular work computed from the employee's rate of pay. A reproduction of this is on page 87.

When this system becomes established a miscellaneous-crop grower will usually have several different crops on which to keep separate records; for this purpose we give each crop a number and it is this number that is indicated on the card. Under this system an employee makes out a separate card for each crop he works on during the day, all of his cards being turned in to the office at the end of each day.

Our Sweet Pea crop, then, receives its first recognition when the seed is purchased, the price of the seed being recorded on the summary sheet under "Materials." When the seed is sown, the labor is turned in on a time card marked, we will say, Crop No. 1. This card is put away to be kept with other cards representing work done on Crop No. 1, all to be totalled and the total money represented entered on the summary sheet at the end of every month under the heading, "Labor."

When the seedlings are ready to transplant and support most of the materials used must be charged to overhead. Such items as fertilizers, string, wire and wood supports and all insectides come under this heading. Some of these materials such as string and insectides may be charged directly to the crop if large amounts are used but be careful not to enter the material on the overhead sheet if it has already been charged to the crop.

Another phase of our system is represented on the summary sheet under the heading of "Receipts." When our first flowers are cut and

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sold either retail or wholesale, entries are made in the column provided. As receipts in our individual case are practically all from wholesale markets, we make entries once a week, using the market return sheet as our guide. Retail or other miscellaneous sales may be listed as made on a separate sheet and entered on the summary sheet daily, weekly, or monthly. In the case of a Sweet Pea crop, our entry might look something like this:

(week of) 2:23 to 30, 10,000, \$100.00.

Let us now skip a few months and see what happens when the Sweet Peas are through blooming, all receipts entered on the sheet, all labor and materials used, entered and the crop is "out." On top of the summary sheet will be found a blank space designated, "planted" and is to be filled in with the date the crop was planted into its flowering bed. From this, together with the date they were torn out, is computed the number of days the crop of Peas occupied greenhouse space. The blank marked, "Sq. Ft." should contain the ACTUAL GROWING SPACE occupied by the crop — in other words, the square feet of bench space used by it. These figures are used in computing the overhead cost charged to this crop.

Handling Overhead Costs

Since any system of keeping track of costs must make some disposition of all bills paid out for the business, no matter how small or for what, a department in our system designated as "overhead" has been established to handle collectively ALL COSTS THAT CANNOT BE COMPLETELY AND DIRECTLY CHARGED TO INDIVIDUAL CROPS. Among the numerous costs confronting a miscellaneous crop grower that should be entered here are water bills or pumping costs, electric bills, cost of operating trucks, cars, etc., express charges of flower shipments and also all heating costs — fuel, fireman's wages, etc. Also under this heading must come rent on land and buildings or depreciation on buildings and on greenhouses, and taxes.

The best and simplest way to keep track of these overhead costs is to enter them on a sheet made for the purpose, AT THE TIME BILLS ARE RECEIVED. Thus a sheet of this kind would contain entries like this: telephone for April, \$10.19; water for April, \$25.00; repair on truck, \$3.50, etc. It is really necessary to let the summarizing of a sheet of this kind go for a year because certain costs such as taxes, depreciation on greenhouses, etc. are only figured annually.

A problem confronting us at this point is that of differentiating between summer and winter costs. Very obviously, a crop grown in the winter in latitudes where firing is necessary, costs considerably more than one grown during the summer. In attempting to solve this we divided the year into two divisions, the winter season and

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Employee No. **Crop No.** **Date**

A. M.	P. M.	OTHER WORK
7:00	1:00	Unloading Coal
:15	:15	Repairing Machinery
:30	:30	Repairing Pipes
:45	:45	Repairing Houses
8:00	2:00	Painting
:15	:15	Firing
:30	:30	Packing
:45	:45	Misc. Cleaning, Etc.
9:00	3:00	
:15	:15	
:30	:30	
:45	:45	
10:00	4:00	
:15	:15	
:30	:30	
:45	:45	
11:00	5:00	
:15	:15	
:30	:30	
:45	:45	
12:00	6:00	
:15	:15	
:30	:30	
:45	:45	

Total Hours.....**Rate**.....**Amt.**.....

On this reproduction of our employee's time card, the items listed under "Other Work" are all classed as overhead and are for our convenience in analyzing our annual overhead figure.

the summer season. In our latitude the winter or firing season begins October 15 and ends May 15. The overhead cost of the greenhouse plant during the 5 summer months equals the total overhead for the year minus all costs incident with operating the heating plant (wages of a night fireman, fuel costs, boiler repairs and heating pipes and their up-keep) divided by 5/12. The remaining 7/12 plus the costs of heating as illustrated above, equals the overhead figure for the winter period.

Other costs that must be charged to overhead are miscellaneous labor performed daily about the greenhouse such as sweeping and cleaning, landscape work about the premises, repair work done on machinery, boilers and greenhouses, buildings, etc., packing flowers for shipment and the time or salary of a foreman or overseer. When time cards are filled out for this time, the work done should be designated on the card either by checking the items mentioned or writing in the space provided. At the end of the month these cards should all be totalled and entered on the overhead sheet.

And finally, in totaling up all these overhead costs and applying them to the crops that ultimately must pay all these bills, we make the charges in this manner: The bench space of the whole establishment is totalled in square feet and these figures divided into the summer and winter period overhead totals respectively give us the overhead cost per square foot of bench space for each season. It will be found convenient to reduce this still further to a figure for each square foot per month or week during the two periods.

To return to our Sweet Pea crop, let us assume that it occupied two benches each 4 feet by 200 feet and was planted November 1 and torn out June 15. This means the overhead chargeable to this crop will be for 1,600 square feet during $6\frac{1}{2}$ months of winter and 1 month of summer. And it is certainly surprising what a total this will make!

Summary

Now all there is left to do is total up all the columns of figures and bring the totals down to the bottom of the page where the difference between receipts on one side and the total of labor, materials, and overhead, constitute the good — or bad news!

The all-important factor in the use of a system such as outlined above is of course that of maintaining it DAY BY DAY. Once the proper set-up is made and the system is correctly started, surprisingly little time and expense is required in its up-keep. Cost summary sheets may be printed at very little cost or may be mimeographed or ruled out by hand; some kind of loose-leaf binder is necessary to keep the sheets together and in order; time cards may be printed on cheap stiff paper at very little cost — a dozen or more for a penny — and

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beyond these the time spent is the only remaining factor. Our boys working under this system carry a heavy manilla paper envelope around with them containing a supply of cards which are made out as each job is done. One man, of course, may work on a dozen different crops during the course of a day and a separate card must, of course, be made out for each one. Very little time need be spent by men on the job since most of the time required in maintaining the system is that used in totaling cards and making entries on the summary sheets.

As our system is working with us, the foreman turns in to the office each morning time cards representing work done the day before and slips of paper itemizing all materials used that may be charged to a particular crop. (These "Materials used" slips are made out on the job by the man using the materials and is turned in with his time cards). These are filed by crops with the labor cards and at the end of the month or whenever the labor cards are entered, these are totalled and entered.

An added feature we have worked out is that of making out pay-roll checks from these cards turned in. Men making out cards are cautioned to check their cards over at the end of the day to make certain the total time they worked is represented on the cards and before the daily cards are filed by crop numbers, a total of each man's time for the day is made and entered on a pay-roll sheet. However, this feature is an added complication and need not be used, since it would probably involve a change in whatever system is already in force regarding pay-roll accounts.

In instituting and maintaining a system of this kind it must be borne in mind that the system outlined above was worked out to meet one set of conditions and the author and those who are responsible for its development do not intend it to be taken literally as outlined, but they offer the above as an outline of a system that is now working successfully under a normal set of greenhouse conditions. Anyone adopting this system must, of course, make adjustments to fit local conditions.

It should be obvious that the value of a system of this kind is cumulative, increasing with the time it has been in operation. Figures over a period of years tell a considerably more important story than those for a single season. And right here we find the most important phase of this chapter on cost-finding — the object of the whole system as outlined. The figures obtained on the cost summary sheets are not the end or object of the system but merely the means employed to arrive accurately at not only net figures for individual crops but also the various costs and receipts that are frequently of surprising interest. Also the same analysis may be employed with regard to methods and systems of growing, crop rotation plans, etc. For

Crop	Crop No.	Plant	Beds	Size
Early Sweet Pear	9	2	2	4' x 200
		Sq. Ft. 1600	Begun 11/1-32	Closed 6/15-33

[illegible]

Receipts

Labor	Gross Rec.
Mtl.	Less Comm.
Overhead	Less Costs
	Net

The head of this reproduction of our summary sheet is filled out as it might appear for a crop of Sweet Peas. The space following that for the crop number designated, "Plant——," is for our convenience in designating our two greenhouse Plants. The space for the number of beds and their sizes is to facilitate figuring the square feet of growing space referred to in the text.

The "BALL RED BOOK"

example we have in the past few seasons attempted to eliminate the "potting" stage in carrying along young plants. Thus our Snapdragon crop goes from the seed bed to flats where the seedlings are pricked off about 1 inch each way. From flats the plants go right into their flowering bed. Our Aster crop out-doors is planted directly from the seed bed to the out-door flowering beds. In sowing seed care may be taken to sow seed a little thinner than usual so that the plants may remain in the bed a little longer. Imagine the cost of potting 25,000 or 50,000 plants and what a difference it would make in the "labor" column on that cost summary sheet!

It is little discoveries such as the above that will make a system of cost-finding pay its way. When your system has been working a year or two and you again are ready to plan a season's work, get all your figures in front of you and see just which of the crops you grew actually paid their way. This process should not end in indiscriminately discarding all those crops that did not show profit but should be tempered with a study of why they didn't for it must be borne in mind that both growing and market conditions vary from season to season and an ordinarily good-paying crop will have an "off season" occasionally. Also in the management of crops a detailed study of costs with a view to possible cuts and "shaving" here and there usually bring surprisingly interesting and profitable results.

It is this critical attitude of mind that should be the net result of such a system over a period of years — with ample and accurate figures to aid in intelligently making the innumerable decisions and judgments that must be made by the up-to-date grower.

Note: Space doesn't permit us taking up many of the innumerable details confronting anyone working out a system of this kind and the author will be glad to help in the management of these, or in correspondence with anyone to whom this explanation is not entirely clear.



The spreading of professional information or experience is an entirely normal impulse without which any business would shrivel. It is true we occasionally meet a wise old owl who, with a superior attitude, locks his doors, but the successful man or woman today readily exchanges information for in doing so one's own ideas might become better balanced.



"Flower Seeds For Florists"

FOR reasons of economy or profit, an increasing interest is being taken in seed-produced cut flowers and pot plants. The variety is limitless and the improvements offered annually must be checked. Novelties occasionally creep into the lists that are worthless for our conditions but this in no way affects the valuable improvements offered annually. In our business of supplying your needs in "Flower Seeds for Florists," our greenhouse business is valuable in checking the worth of new and established varieties and this experience is reflected in our catalogs that are issued in January and July.



WEST CHICAGO, ILL.